

# CHASSIS ELECTRICAL

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E54AA--

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### WARNING REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

#### WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B-Supplemental Restraint System (SRS), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

#### NOTE

The SRS includes the following components: SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by and asterisk (\*).

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**REAR WIPER AND WASHER ..... Refer to GROUP 51**

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NOTES

# BATTERY

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

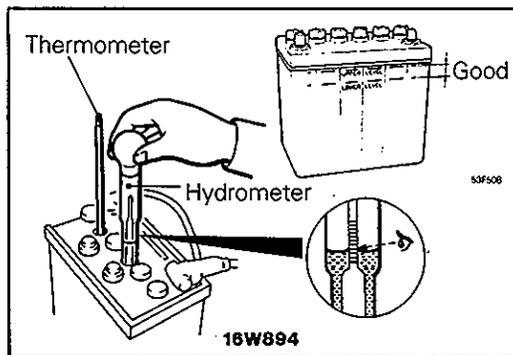
E54CA-

Items		Specifications						
Type		50B24R (S)	55D23R	55D23R-MF	65D23R	75D23R	95D31R	95D31R-MF
Ampere hours (5HR)	Ah	36	48	48	52	60	64	64
Cranking rating [at - 18°C (0°F)]	A	390	356	356	420	447	622	622
Reserve capacity	min.	71	99	99	111	137	159	159

### SERVICE SPECIFICATIONS

E54CB-

Item	Specification
Specific gravity of the battery fluid	1.220–1.290 [20°C (68°F)]



## SERVICE ADJUSTMENT PROCEDURES

E54CBAD

### INSPECTION OF FLUID LEVEL AND SPECIFIC GRAVITY

1. Inspect whether or not the battery fluid is between the UPPER LEVEL and LOWER LEVEL marks.
2. Use a hydrometer and thermometer to check the specific gravity of the battery fluid.

**Standard value: 1.220–1.290 [20°C (68°F)]**

The specific gravity of the battery fluid varies with the temperature, so use the following formula to calculate the specific gravity for 20°C (68°F). Use the calculated value to determine whether or not the specific gravity is satisfactory.

$$D_{20} = D_t + 0.0007 (t - 20)$$

**D<sub>20</sub>: Specific gravity of the battery fluid calculated for 20°C (68°F).**

**D<sub>t</sub>: actually measured specific gravity**

**t: actually measured temperature**

### VISUAL INSPECTION

Inspect after removing the battery.

#### Caution

**If battery fluid has leaked from the battery, use rubber gloves to protect your hands when removing the battery.**

- (1) If there is corrosion of the battery stays or battery brackets from the battery fluid, clean by washing in warm or cold water.
- (2) If there is a leak from a crack in the battery case, replace the battery.
- (3) Clean the battery terminals with a wire brush, and replace any parts that are damaged.

**CHARGING**

1. When charging a battery while still installed in the vehicle, disconnect the battery cables to prevent damage to electrical parts.
2. The current normally used to charge a battery should be approximately 1/10th the battery capacity.
3. When quick charging due to lack of time, etc., the charging current should never exceed the battery capacity as indicated in amperes.
4. Determining if charging is completed.
  - (1) If the specific gravity of the battery fluid reaches 1.250–1.290 and remains constant for at least one hour.

- (2) If the voltage of each cell reaches 2.5–2.8 V and remains constant for at least one hour.

**Caution**

- (1) **Take care since the battery fluid level may rise during charging.**
- (2) **Keep all sources of fire away while charging because there is danger of explosion.**
- (3) **Take care not to do anything that could generate sparks while charging.**
- (4) **When charging is completed, replace the battery caps, pour clean water over the battery to remove any sulfuric acid any dry.**

**BATTERY TEST**

E54CBAA

TEST STEP		RESULT	ACTION TO TAKE
A0	VISUAL INSPECTION	 ►	CLEAN terminals and clamps. Go to A1.
	<ul style="list-style-type: none"> <li>• Remove negative cable, then positive cable.</li> <li>• Check for dirty or corroded connections.</li> </ul>	 ►	Go to A1.
A1	LOOSE BATTERY POST	 ►	REPLACE battery.
	<ul style="list-style-type: none"> <li>• Check for loose battery post.</li> </ul>	 ►	Go to A2.
A2	CRACKED BATTERY COVER	 ►	REPLACE battery.
	<ul style="list-style-type: none"> <li>• Remove hold-downs and shields.</li> <li>• Check for broken/cracked case or cover.</li> </ul>	 ►	Go to A3.
A3	OPEN CIRCUIT VOLTAGE TEST.	 ►	CHARGE battery at 5 amps, then go to A3.
	<ul style="list-style-type: none"> <li>• Turn headlamps on for 15 seconds.</li> <li>• Turn headlamps off for 2 minutes to allow battery voltage to stabilize.</li> <li>• Disconnect cables.</li> <li>• Read open circuit voltage.</li> </ul>	OPEN CIRCUIT VOLTAGE UNDER 12.4 VOLTS  ►	Go to A4.
A4	LOAD TEST	 ►	REPLACE battery.
	<ul style="list-style-type: none"> <li>• Connect a load tester to the battery.</li> <li>• Load the battery at the recommended discharge rate (See LOAD TEST RATE CHART) for 15 seconds.</li> <li>• Read voltage after 15 seconds, then remove load.</li> </ul>	VOLTAGE IS LESS THAN MINIMUM LISTED  ► VOLTAGE IS MORE THAN MINIMUM LISTED	Battery OK.

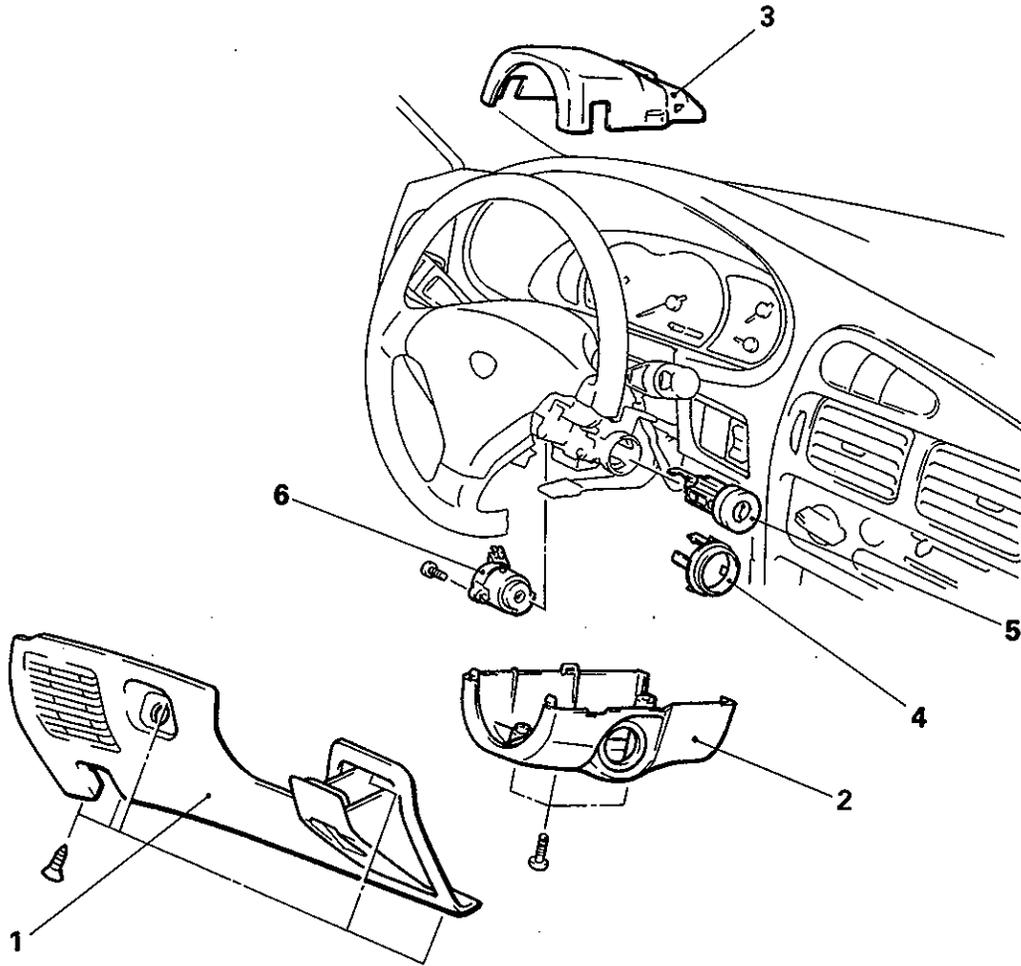
LOAD TEST RATE CHART			
Load test (amps)	Cranking rating [-18 °C (0°F)]	Reserve capacity (min.)	Application
190	390	71	50B24R(S)
170	356	99	55D23R, 55D23R -MF
210	420	111	65D23R
220	447	137	75D23R
310	622	159	95D31R, 95D31R -MF

LOAD TEST CHART		
Minimum voltage	Temperature	
	°C	°F
9.6	21 and above	70 and above
9.5	16	60
9.4	10	50
9.3	4	40
9.1	-1	30
8.9	-7	20
8.7	-12	10
8.5	-18	0

## IGNITION SWITCH

E54DH-

## REMOVAL AND INSTALLATION



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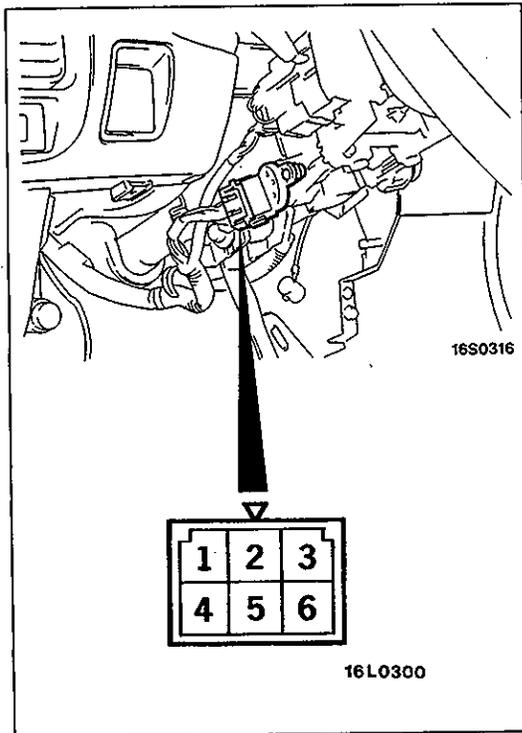
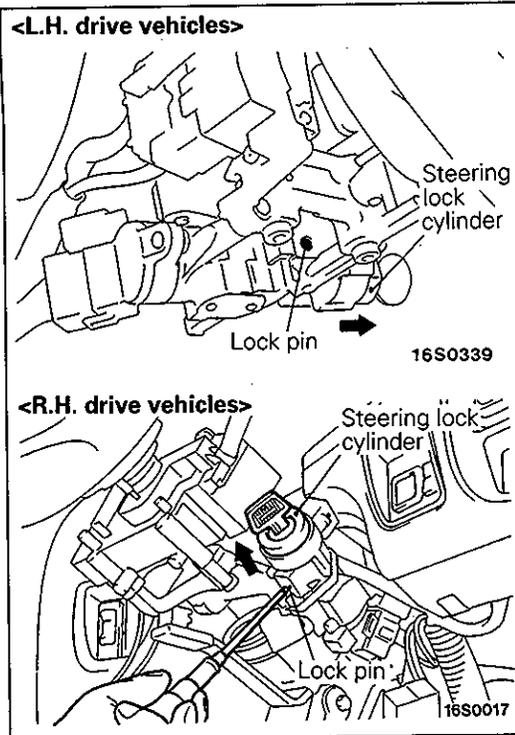
**Ignition switch segment removal steps**

1. Instrument lower panel
2. Column cover lower
3. Column cover upper
6. Ignition switch

**Steering lock cylinder removal steps**

1. Instrument lower panel
2. Column cover lower
3. Column cover upper
4. Ignition key ring
5. Steering lock cylinder





**SERVICE POINTS OF REMOVAL**

E54DIAI

**5. REMOVAL OF STEERING LOCK CYLINDER**

- (1) Insert the key in the steering lock cylinder and turn it to the "ACC" position.
- (2) Using a cross-tip (+) screwdriver (small) or a similar tool, push the lock pin of the steering lock cylinder inward and then pull the steering lock cylinder toward you.

**INSPECTION**

E54DJAR

**IGNITION SWITCH**

- (1) Remove the instrument lower panel and column cover.
- (2) Disconnect the wiring connector from the ignition switch, and connect a circuit tester to the switch side connector.
- (3) Operate the switch, and check the continuity between the terminals.

Terminal	Terminal					
	1	2	3	4	5	6
Ignition key position						
LOCK						
ACC		○	—	—	○	
ON	○	○	○	—	○	
START		○	○	○	—	○

**NOTE**

○—○ indicates that there is continuity between the terminals.

**METERS AND GAUGES****SPECIFICATIONS****GENERAL SPECIFICATIONS**

E54EA--

Items	Specifications
Speedometer Type	Rotary magnet type
Tachometer Type	Pulse type
Fuel gauge Type	Cross coil type fixed needle gauge
Fuel gauge unit Type	Variable resistance type (with fuel level warning sensor)
Engine coolant temperature gauge Type	Cross coil type
Engine coolant temperature gauge unit Type	Thermistor type

**SERVICE SPECIFICATIONS**

E54EB--

Items	Specifications
Standard value	
Speedometer indication error	km/h (mph)
40 (20)	40-48 (20-25)
80 (40)	80-92 (40-47)
120 (60)	120-136 (60-69)
160 (80)	160-180 (80-91)
Tachometer indication error	r/min
<Petrol-powered vehicles>	
Type A (8,000 r/min)	
700	± 100
3,000	± 150
5,000	± 250
6,000	± 300
Type B (9,000 r/min)	
700	± 100
3,000	+225 - 100
5,000	+325 - 125
7,000	+400 - 100
<Diesel-powered vehicles>	
700	± 100
3,000	± 150
5,000	± 250



Items	Specifications
Engine coolant temperature gauge resistance $\Omega$ <Vehicles without tachometer> Power supply and earth Power supply and engine coolant temperature gauge Engine coolant temperature gauge and earth <Vehicles with tachometer> Power supply and earth Power supply and engine coolant temperature gauge Engine coolant temperature gauge and earth	 133.2–162.8 71.3–78.8 200.7–245.3  210.6–257.4 71.3–78.8 278.1–340.0

**SEALANTS AND ADHESIVES**

E54EE--

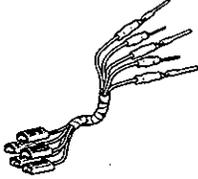
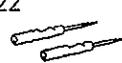
Items	Specified sealants and adhesives	Remark
Engine coolant temperature gauge unit threaded portion	3M Adhesive nut locking No. 4171 or equivalent	Drying sealant

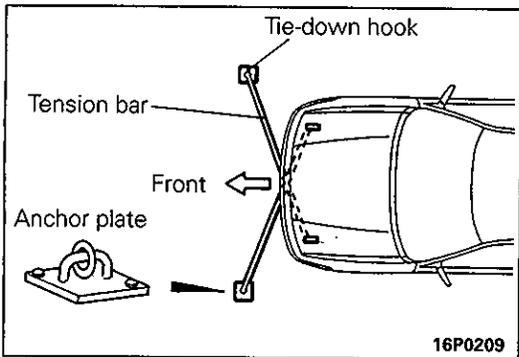
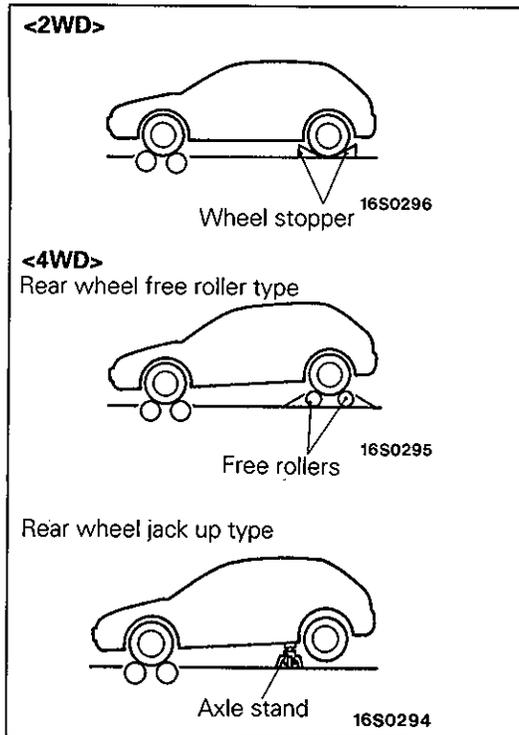
NOTES

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**SPECIAL TOOLS**

54EF--

Tool	Number	Name	Use
<p>MB991219 Test harness</p> 	<p>MB991223</p> <p>MB991220 LED harness</p> 	<p>Harness set</p> <p>MB991221 LED harness adapter</p>  <p>MB991222 Probe</p> 	<p>Fuel gauge simple inspection MB991219</p> <p>MB991219 Connector pin contact pressure inspection MB991220, MB991221 Power circuit inspection MB991222 Commercial tester connection</p>



## SERVICE ADJUSTMENT PROCEDURES

E54EGAZ

### SPEEDOMETER INSPECTION

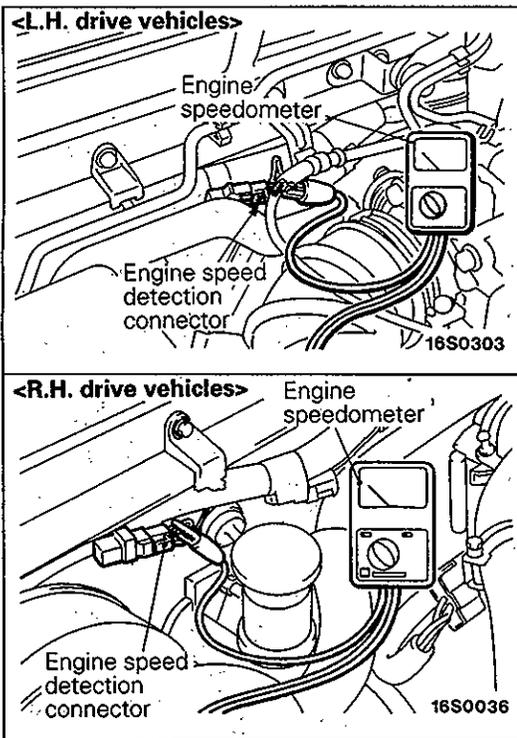
- (1) Adjust the pressure of the tyres to the specified level.  
(Refer to GROUP 31 – General Specifications.)
- (2) Place the vehicle on a speedometer tester drum.
  - <2WD>  
Make sure the parking brake has been set.
  - <4WD>  
Place securely the free rollers to the floor, under the rear wheels so that they are fitted for the wheel base and the wheel tread. <Rear wheel free roller type>  
Jack up the rear wheels and place the axle stands in the specified places. <Rear wheel jack-up type>
- (3) To prevent the front wheel from moving from side to side, attach tension bars to the tie-down hook, and secure both ends to anchor plates.
- (4) To prevent the vehicles from starting, attach a chain or wire to the rear retraction hook, and make sure the end of the chain or wire is secured firmly.
- (5) Check if the speedometer indication range is within the standard values.

#### Caution

**Do not operate the clutch suddenly or increase/decrease speed rapidly while testing.**

#### Standard values:

Standard indication	Allowable range
km/h (mph)	km/h (mph)
40 (20)	40–48 (20–25)
80 (40)	80–92 (40–47)
120 (60)	120–136 (60–69)
160 (80)	160–180 (80–91)



**TACHOMETER INSPECTION**

E54EGBC

<Petrol-powered vehicles>

- (1) Insert a paper clip in the engine speed detection connector from the harness side, and attach the engine speedometer.

NOTE

For tachometer inspection, use of a fluxmeter-type engine speedometer is recommended. (Because a fluxmeter only needs to be clipped to the high tension cable.)

- (2) Compare the readings of the engine speedometer and the tachometer at every engine speed, and check if the variations are within the standard values.

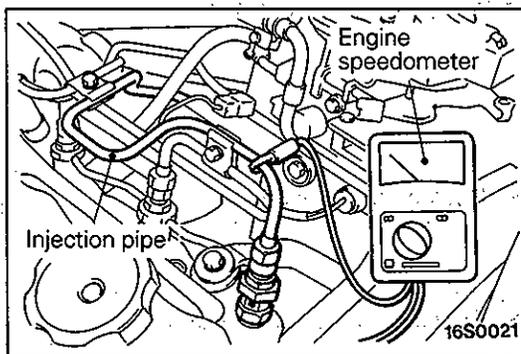
**Standard values:**

<Type A (8000 r/min.)>

<b>Engine speed</b>	<b>Indicated variation</b>
700 r/min.:	± 100 r/min.
3,000 r/min.:	± 150 r/min.
5,000 r/min.:	± 250 r/min.
6,000 r/min.:	± 300 r/min.

<Type B (9000 r/min.)>

<b>Engine speed</b>	<b>Indicated variation</b>
700 r/min.:	± 100 r/min.
3,000 r/min.:	+225 r/min. - 100 r/min.
5,000 r/min.:	+325 r/min. - 125 r/min.
7,000 r/min.:	+400 r/min. - 100 r/min.



<Diesel-powered vehicles>

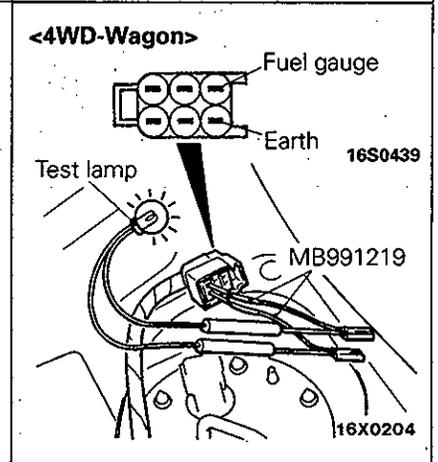
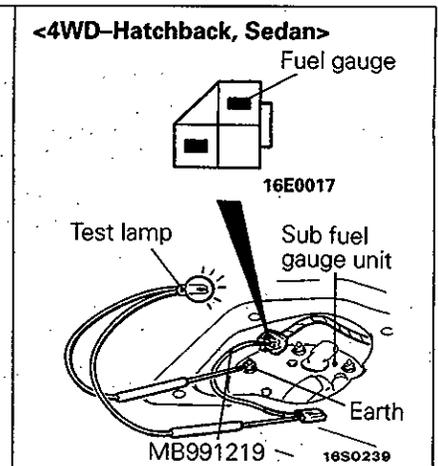
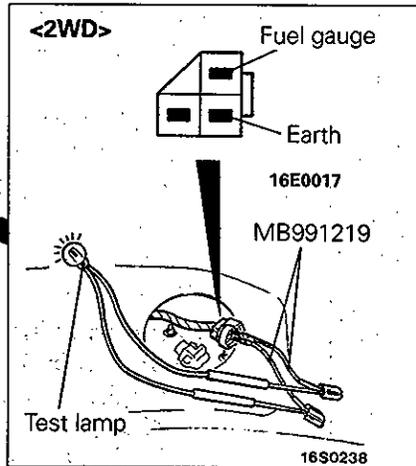
- (1) Connect the engine speedometer to the injection pipe.
- (2) Compare the readings of the engine speedometer and the tachometer at every engine speed, and check if the variation are within the standard values.

**Standard values:**

<b>Engine speed</b>	<b>Indicated variation</b>
700 r/min.:	± 100 r/min.
3,000 r/min.:	± 150 r/min.
5,000 r/min.:	± 250 r/min.

FUEL GAUGE SIMPLE INSPECTION

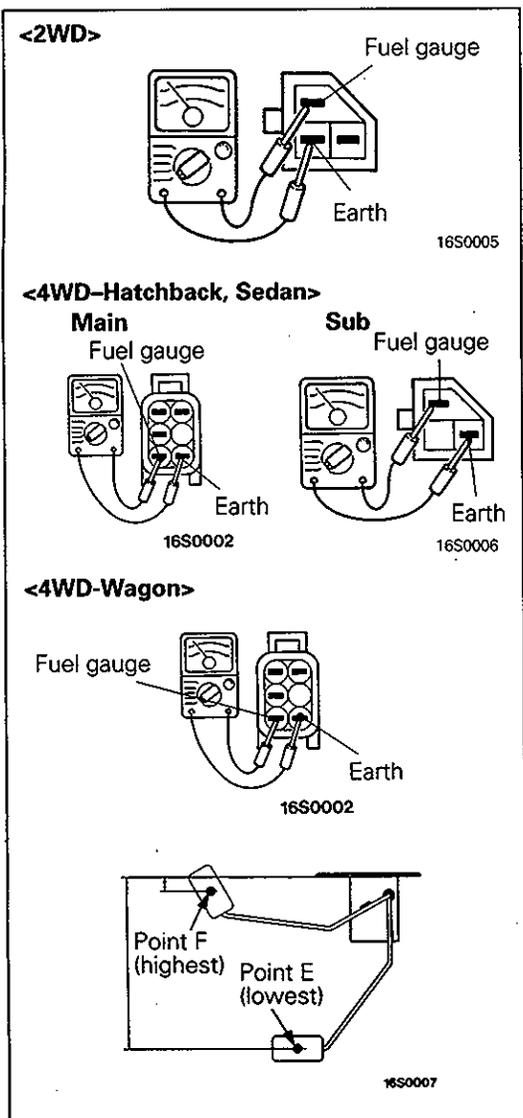
- Remove the fuel gauge unit connector.
- Connect a test lamp (12V-3.4W) to the harness side connector.
- Turn the ignition switch to ON.



**NOTE**  
For 4WD <Hatchback, Sedan>, inspect from the sub fuel gauge unit side.

Check the condition of the test lamp and the gauge.

① Test lamp is illuminated (Gauge needle is not moving)	→	Replace the fuel gauge.
② Test lamp is illuminated (Gauge needle is moving)	→	Replace the fuel gauge unit.
③ Test lamp is not illuminated (Gauge needle is not moving)	→	Repair the harness.



**FUEL GAUGE UNIT INSPECTION**

To check, remove fuel gauge unit from fuel tank. (Refer to GROUP 13 – Fuel Tank.)

**FUEL GAUGE UNIT RESISTANCE**

- (1) Check that resistance value between the fuel gauge terminal and earth terminal is at standard value when fuel gauge unit float is at point F (highest) and point E (lowest).

**Standard value:**

**Hatchback, Sedan**

<b>&lt;2WD&gt;</b>	<b>POINT F:</b>	<b>0.9–5.1 Ω</b>
	<b>POINT E:</b>	<b>102.3–117.7 Ω</b>
<b>&lt;4WD-Main&gt;</b>	<b>POINT F:</b>	<b>0.6–3.0 Ω</b>
	<b>POINT E:</b>	<b>61.2–69.2 Ω</b>
<b>&lt;4WD-Sub&gt;</b>	<b>POINT F:</b>	<b>0.4–2.0 Ω</b>
	<b>POINT E:</b>	<b>41.8–47.8 Ω</b>

**Wagon**

<b>POINT F:</b>	<b>1.0–5.0 Ω</b>
<b>POINT E:</b>	<b>103–117 Ω</b>

- (2) Check that resistance value changes smoothly when float moves slowly between point F (highest) and point E (Lowest).

**NOTES**

1. The following information is for informational purposes only and is not intended to be used as a basis for any warranty or other legal claim. The information is subject to change without notice.

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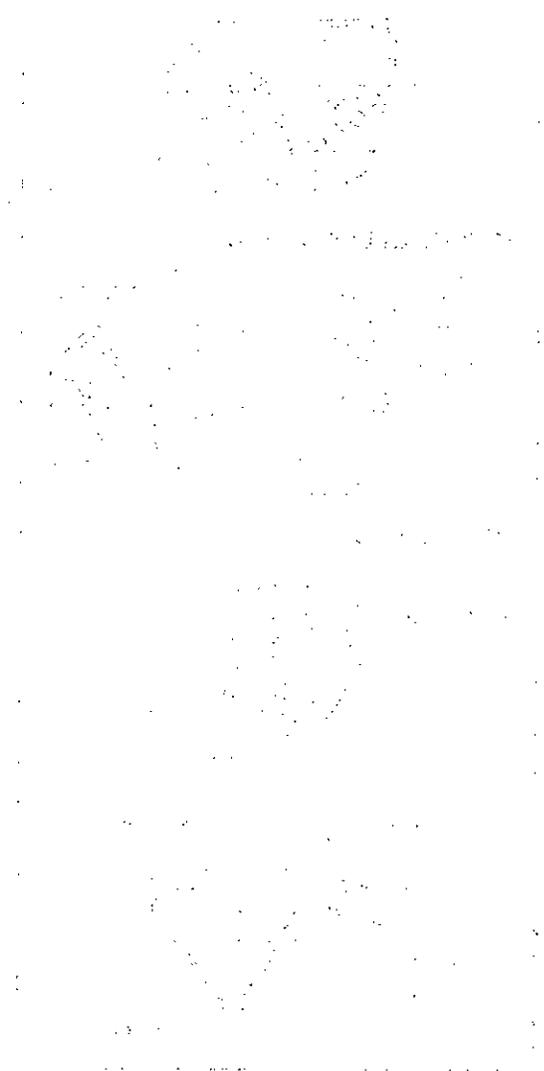
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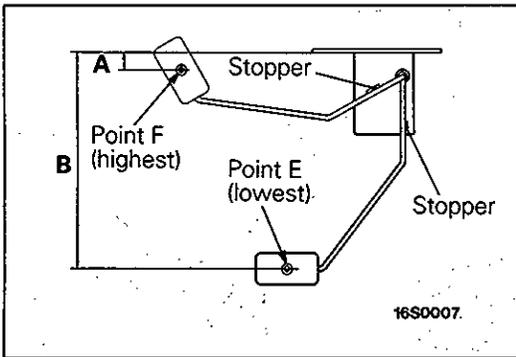
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8. The information is for informational purposes only and is not intended to be used as a basis for any warranty or other legal claim. The information is subject to change without notice.

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10. The information is for informational purposes only and is not intended to be used as a basis for any warranty or other legal claim. The information is subject to change without notice.





**FUEL GAUGE UNIT FLOAT HEIGHT**

Move float and measure the height A at point F (highest) and B at point E (lowest) with float arm touching stopper.

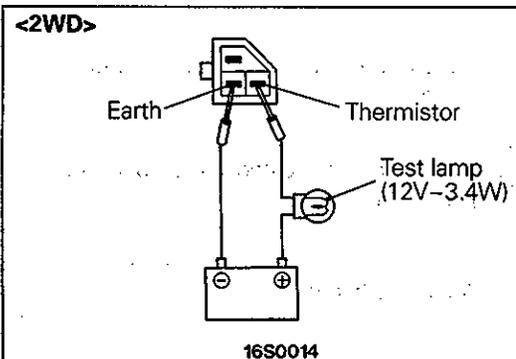
**Standard value:**

**Hatchback, Sedan**

- <2WD> A: 17.4 mm (0.69 in.)  
B: 130.2 mm (5.13 in.)
- <4WD-Main> A: 16.4 mm (0.65 in.)  
B: 122.6 mm (4.83 in.)
- <4WD-Sub> A: 17.8 mm (0.7 in.)  
B: 134.6 mm (5.3 in.)

**Wagon**

- <2WD> A: 4.4 mm (0.17 in.)  
B: 114.7 mm (4.52 in.)
- <4WD> A: 27.0 mm (1.06 in.)  
B: 177.5 mm (6.99 in.)

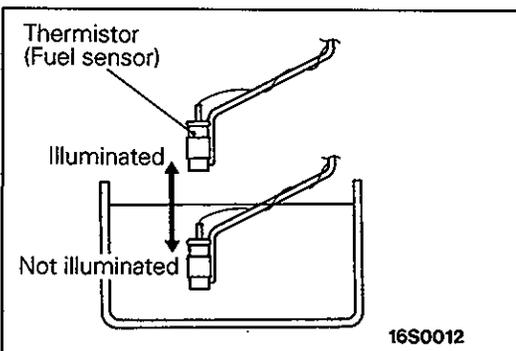
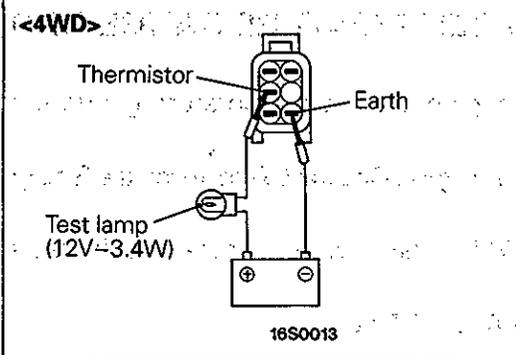


**FUEL SENSOR INSPECTION**

- (1) Connect fuel gauge unit (thermistor) to battery via test light. Immerse in water.

**NOTE**

For 4WD (Hatchback, Sedan) vehicles, check the fuel sensor at the main fuel gauge unit.



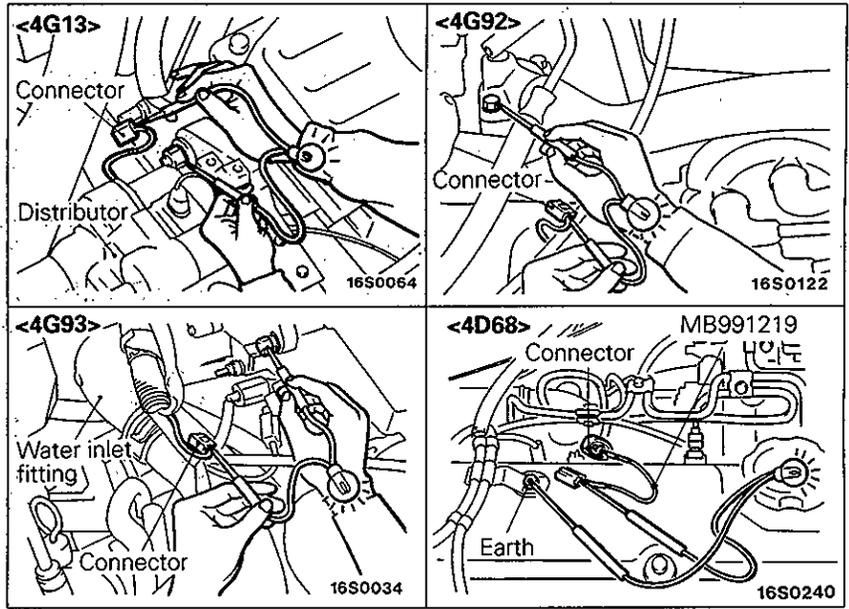
- (2) Condition good if light goes off when unit thermistor is in water and lights when unit is removed from water.

**Caution**

**After completing this test, wipe the unit dry and install it in the fuel tank.**

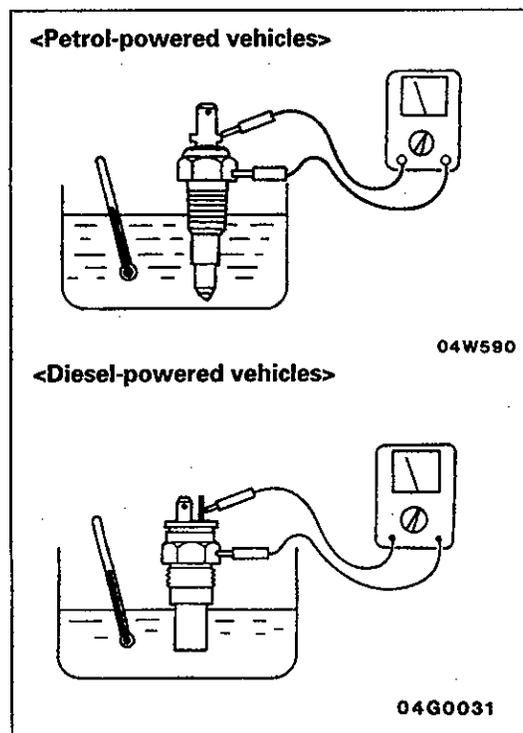
**ENGINE COOLANT TEMPERATURE GAUGE SIMPLE INSPECTION**

- Remove the engine coolant gauge unit connector.
- Connect a test lamp (12V-3.4W) between the harness side connector and the earth.
- Turn the ignition switch ON.



Check the condition of the test lamp and the gauge.

① Test lamp is illuminated (Gauge needle is not moving)	Replace the engine coolant temperature gauge.
② Test lamp is illuminated (Gauge needle is moving)	Replace the engine coolant temperature gauge unit.
③ Test lamp is not illuminated (Gauge needle is not moving)	Repair the harness.



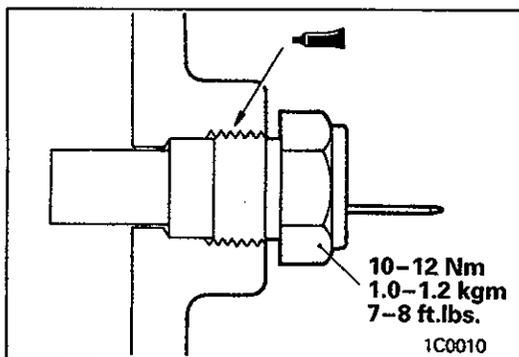
**ENGINE COOLANT TEMPERATURE GAUGE UNIT INSPECTION**

To check, remove the engine coolant temperature gauge unit from intake manifold.

**Standard Resistance of Engine Coolant Temperature Gauge Unit**

(1) Immerse the unit in 70°C (158°F) water to measure the resistance.

**Standard value: 104 ± 13.5 Ω**



- (2) After checking, apply the specified adhesive around the thread of engine coolant temperature gauge unit and install on the intake manifold.

**Specified sealant: 3M Adhesive Nut Locking No. 4171 or equivalent**

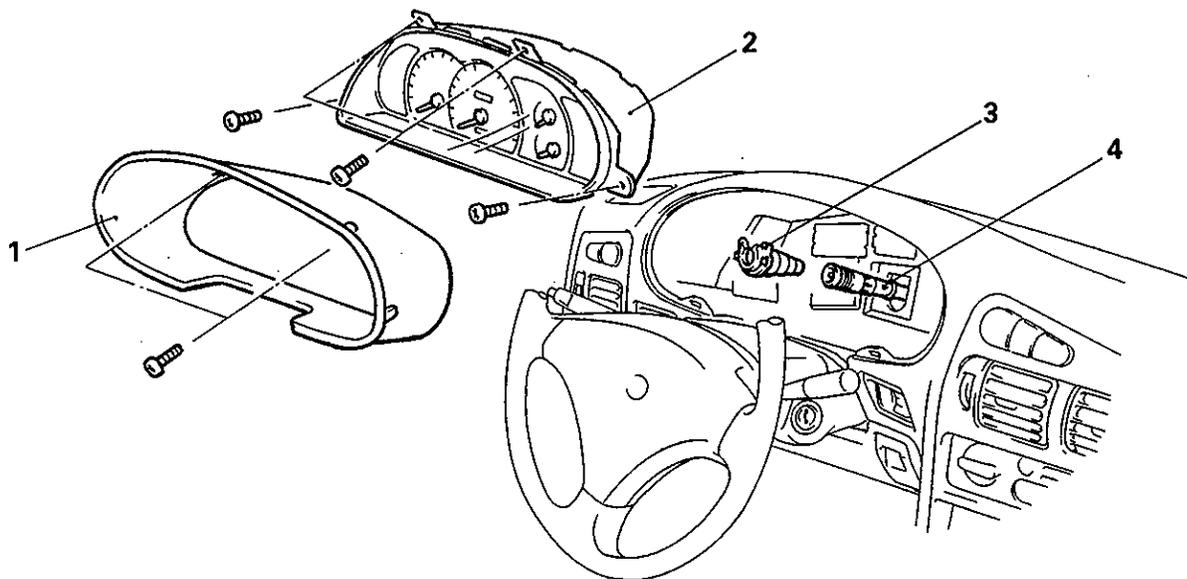
NOTES:

1. This diagram is for reference only. Always refer to the actual engine for correct identification of parts and components.



## COMBINATION METER REMOVAL AND INSTALLATION

E54EH--

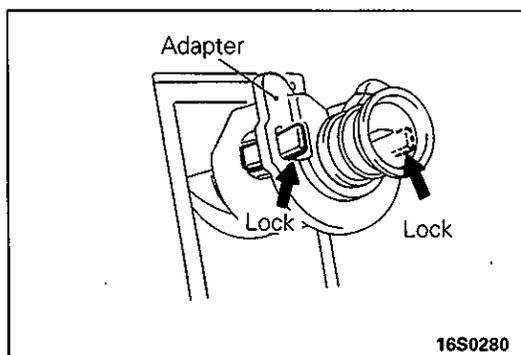


### Removal steps



1. Meter bezel
2. Combination meter
3. Adapter
4. Speedometer cable

16S0325



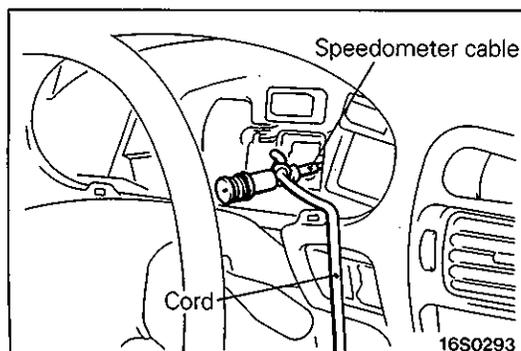
16S0280

## SERVICE POINTS OF REMOVAL

E54EIAM

### 3. REMOVAL OF ADAPTER

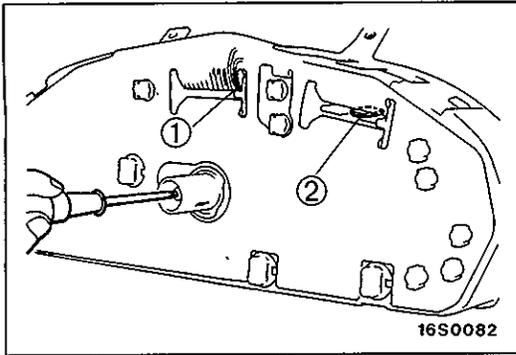
- (1) Remove the adapter lock.
- (2) Pull the speedometer cable slightly into the passenger compartment, and remove the rear side of the adapter from the cable.
- (3) After turning the adapter so that the notched section is aligned with the tab on the cable side, remove the adapter by sliding it backwards.



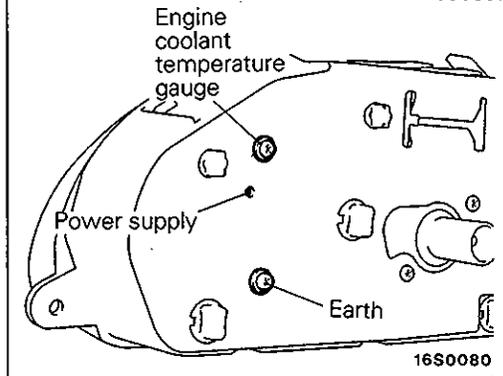
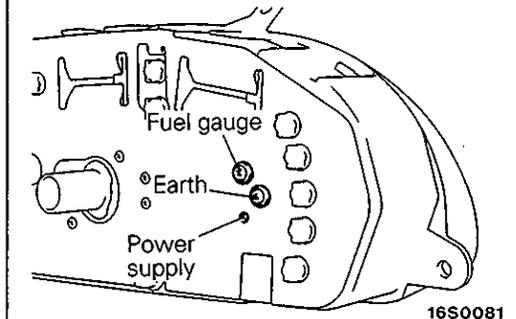
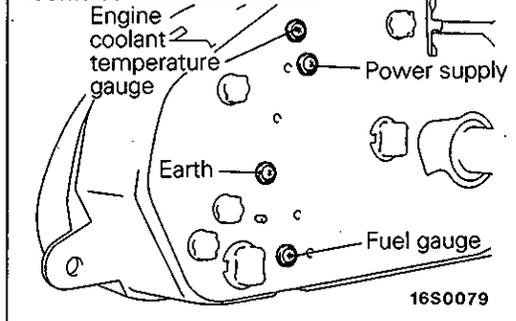
16S0293

### 4. REMOVAL OF SPEEDOMETER

Tie a cord to the end of the speedometer cable that is in the passenger compartment. Then remove the grommet inside the engine compartment, and pull the cable into the engine compartment.

**INSPECTION****REED SWITCH**

Using a circuit tester, check that continuity and discontinuity alternates between terminals 1 and 2 four times at every rotation of the shaft of the speedometer cable connection.

**<Vehicles without tachometer>****<Vehicles with tachometer>****FUEL GAUGE RESISTANCE AND ENGINE COOLANT TEMPERATURE GAUGE RESISTANCE****<Vehicles without tachometer>**

- (1) Remove the power supply tightening screw,
- (2) Use a circuit tester to measure the resistance value between the terminals.

**Caution**

When inserting the testing probe into the power supply terminal, be careful not to touch the printed board.

**Standard value:****Fuel gauge resistance**

Power supply – Earth:	218.7–267.3 $\Omega$
Power supply – Fuel gauge:	74.7–91.3 $\Omega$
Fuel gauge – Earth:	144.0–176.0 $\Omega$

**Engine coolant temperature gauge resistance**

Power supply – Earth:	133.2–162.8 $\Omega$
Power supply – Engine coolant temperature gauge:	71.3–78.8 $\Omega$
Engine coolant temperature gauge – Earth:	200.7–245.3 $\Omega$

**<Vehicles with tachometer>**

Use a circuit tester to measure the resistance value between the terminals.

**Standard value:****Fuel gauge resistance**

Power supply – Earth:	210.6–257.4 $\Omega$
Power supply – Fuel gauge:	78.3–95.7 $\Omega$
Fuel gauge – Earth:	132.3–161.7 $\Omega$

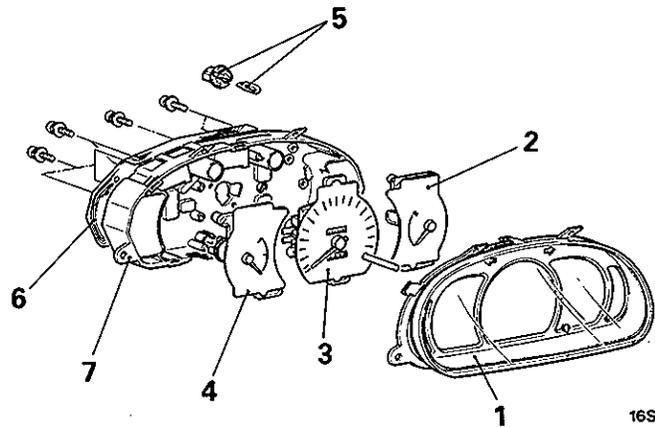
**Engine coolant temperature gauge resistance**

Power supply – Earth:	210.6–257.4 $\Omega$
Power supply – Engine coolant temperature gauge:	71.3–78.8 $\Omega$
Engine coolant temperature gauge – Earth:	278.1–340.0 $\Omega$

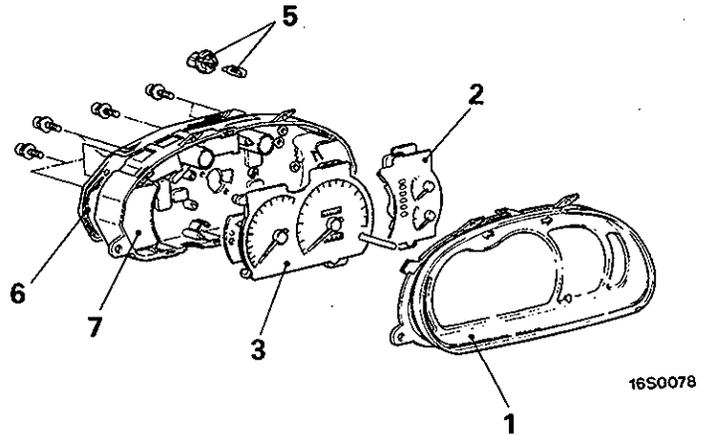
DISASSEMBLY AND REASSEMBLY

E54EL--

<Vehicles without tachometer>



<Vehicles with tachometer>



**Disassembly steps**

1. Meter glass, window plate
2. Engine coolant temperature gauge  
<Vehicles without tachometer>  
Fuel gauge, engine coolant temperature gauge  
<Vehicles with tachometer>
3. Speedometer  
<Vehicles without tachometer>  
Speedometer, tachometer  
<Vehicles with tachometer>
4. Fuel gauge  
<Vehicles without tachometer>
5. Bulb, socket
6. Printed-circuit board
7. Meter case

## INDICATORS AND WARNING LAMPS

E54FBAK

Unit: W

Items	Specifications
Upper-beam indication lamp	1.4
Turn-signal indication lamp	1.4
Hazard indication lamp	1.4
Rear fog lamp indication lamp	1.4
Overdrive off indication lamp (A/T)	1.4
Automatic transmission indication lamp	1.4
POWER/ECONOMY indication lamp (A/T)	1.4
Oil pressure warning lamp	1.4
Brake warning lamp	1.4
Charge warning lamp	1.4
Low fuel warning lamp	3.4
Door ajar warning lamp	1.4
Check engine warning lamp	1.4
Anti-lock braking system warning lamp	1.4
Fuel filter warning lamp	1.4
Glow indication lamp*	1.4
Supplemental restraint system warning lamp	1.4

## NOTE

\*: Diesel powered vehicles

# LIGHTING SYSTEM

## SPECIFICATIONS

E54GA--

### GENERAL SPECIFICATIONS

Unit: W

Items	Specifications
Exterior lamps	
Headlamp	60/55
Position lamp	
<Hatchback>	5
<Sedan, wagon>	4
Front fog lamp	55
Front turn signal lamp	21
Side turn signal lamp	5
Rear combination lamp	
Turn signal lamp	21
Stop and tail lamp	21/5
Tail lamp <Hatchback>	5
Back-up lamp	21
Rear fog lamp	21
License lamp	5
High mounted stop lamp	LED
Interior lamps	
Room lamp	10
Luggage compartment lamp <Hatchback, Sedan>	5
Cargo room lamp <Wagon>	10

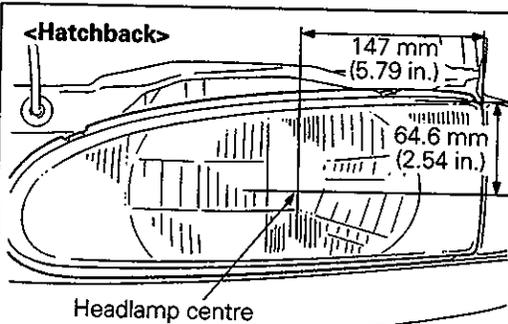
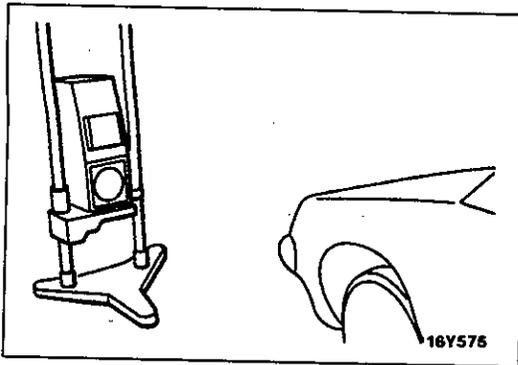
NOTE

LED: Light Emitting Diode

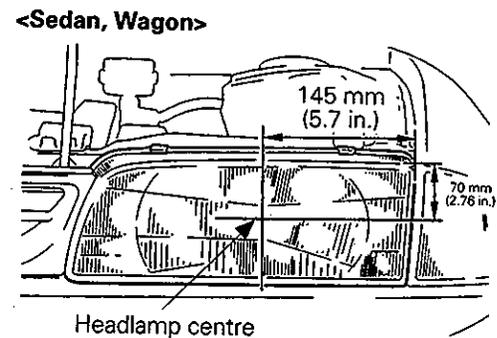
### SERVICE SPECIFICATIONS

E54BG--

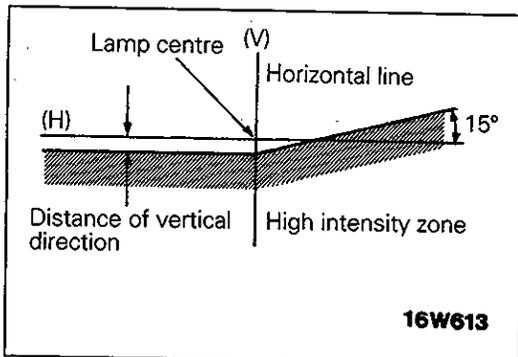
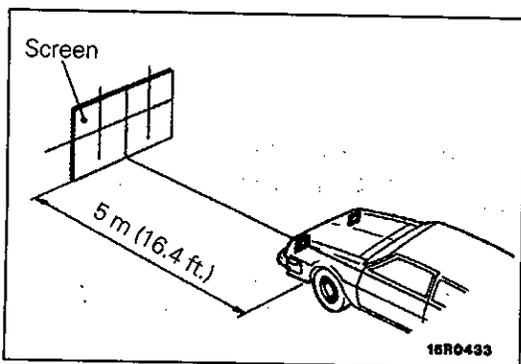
Items	Specifications
Standard value	
Headlamp aiming	
For lower beam adjustment	
Vertical direction	60 mm (2.36 in.) below horizontal (H)
Horizontal direction	Position where the 15° sloping section intersects the vertical line (V)
Front fog lamp aiming	
Vertical direction	100 mm (3.94 in.) below horizontal (H)
Horizontal direction	Deviation of light beam axis is within 393mm (15.4in.) to the left and right
Resistance between resistor terminals <R.H. drive vehicles with dim-dip lamp>	Approx. 1 Ω
Limit	
Headlamp intensity	30,000 cd or more



16S0365



16S0497



## SERVICE ADJUSTMENT PROCEDURES

E54GGBE

### HEADLAMP AIMING

#### <USING A BEAMSETTING EQUIPMENT>

- (1) The headlamps should be aimed with the proper beamsetting equipment, and in accordance with the equipment manufacturer's instructions.

#### NOTE

If there are any regulations pertinent to the aiming of headlamps in the area where the vehicle is to be used, adjust so as to meet those requirements.

- (2) Alternately turn the adjusting screw to adjust the headlamp aiming. (Refer to P.54-21.)

#### <USING A SCREEN>

- (1) Measure the centre of the headlamp as shown in the illustration.
- (2) Inflate the tyres to the specified pressures and remove the load from the vehicle (except a driver).

- (3) Set the distance between the screen and the centre of the headlamps as shown in the illustration.
- (4) With the engine running at 2,000 r/min, aim the headlamps.

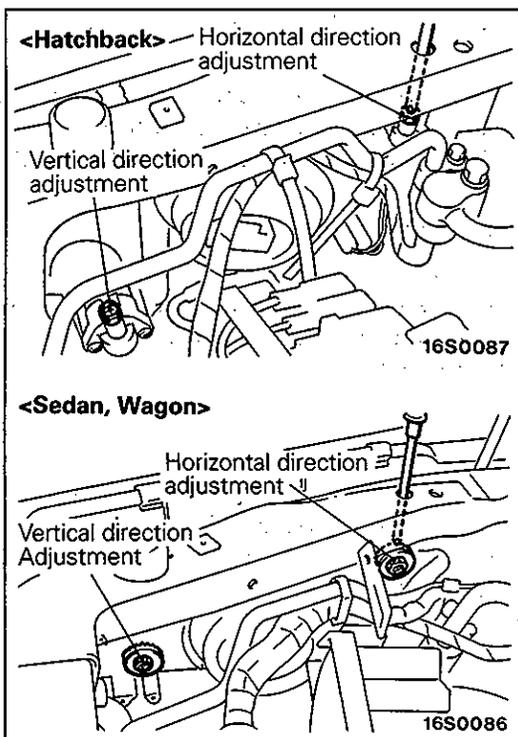
- (5) Check if the beam shining onto the screen is at the standard value.

**Standard value: <For lower beam adjustment>**  
**(Vertical direction)**

**60 mm (2.36 in.) below horizontal (H)**

**(Horizontal direction)**

**Position where the 15° sloping section intersects the vertical line (V)**



- (6) Alternately turn the adjusting screw to adjust the headlamp aiming.

**Caution**

**Be sure to adjust the aiming adjustment screw in the tightening direction.**

**INTENSITY MEASUREMENT**

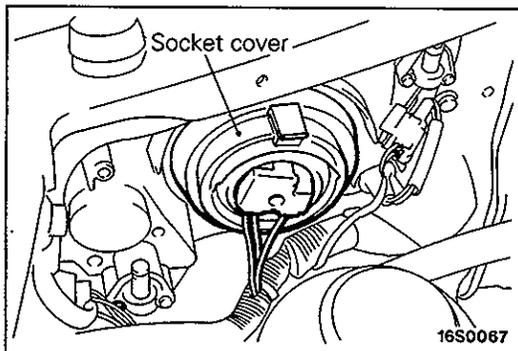
Using a photometer, and following its manufacture's instruction manual, measure the headlamp intensity and check to be sure that the limit value is satisfied.

**Limit: 30,000 cd or more**

**NOTE**

1. When measuring the intensity, maintain an engine speed of 2,000 r/min., with the battery in the charging condition.
2. There may be special local regulations pertaining to headlamp intensity; be sure to make any adjustments necessary to satisfy such regulations.
3. If an illuminometer is used to make the measurements, convert its values to photometer values by using the following formula.

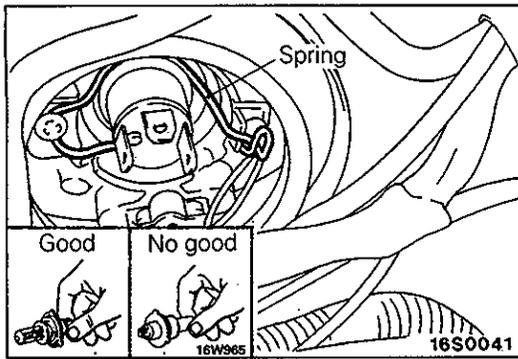
$I = Er^2$  Where: I = intensity (cd)  
 E = illumination (lux)  
 r = distance (m) from headlamps to illuminometer



**REPLACEMENT OF REPLACEABLE BULB**

**Headlamp bulb**

1. Disconnect the connector.
2. Remove the socket cover.



3. Remove the bulb attachment spring and pull out the bulb.
- Caution**  
**Do not touch the surface of the headlamp bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.**

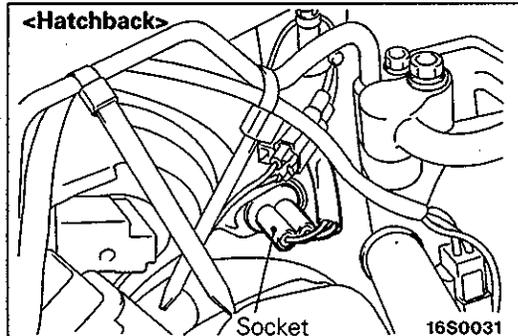
4. Install the socket cover securely.

**NOTE**

If the socket cover is not securely installed, the lens will be out of focus, or water will get inside the lamp unit, so the cover should be securely installed.

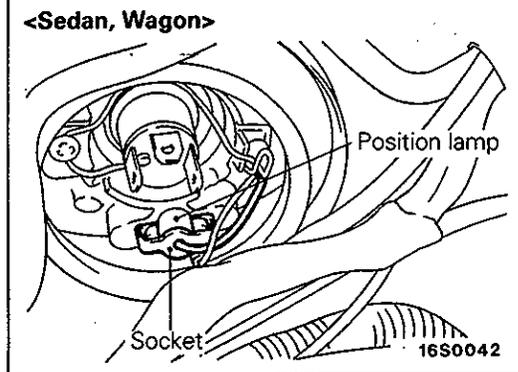
**Position Lamp Bulb**

**<Hatchback>**



1. Remove the reserve tank. (When replacing only the right side bulb) (Refer to GROUP 14 – Radiator.)
2. Turn the position lamp together with the socket and remove it, and then take out the bulb.

**<Sedan, Wagon>**

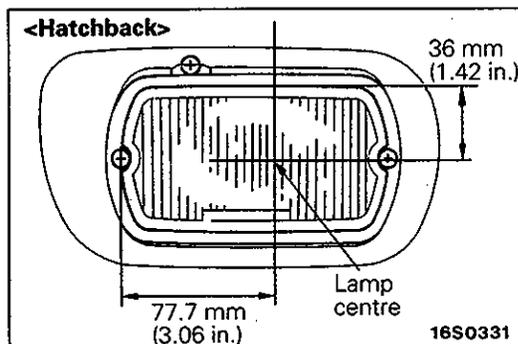


1. Disconnect the headlamp connector, and remove the socket cover.
2. Remove the position lamp together with the socket, and then take out the bulb.
3. After installing the position lamp, install the socket cover taking care not to mistake the direction.

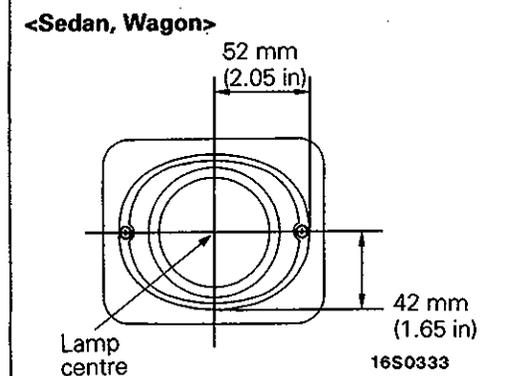
**NOTE**

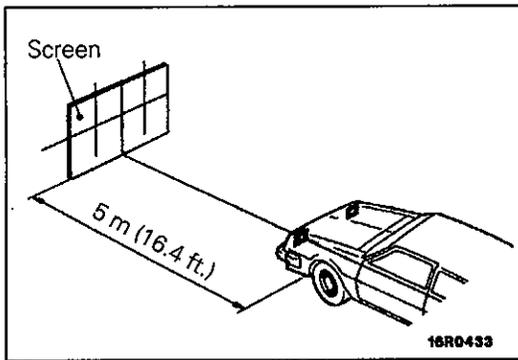
If the socket cover is not securely installed, the lens will be out of focus, or water will get inside the lamp unit, so the socket cover should be securely installed.

**FOG LAMP AIMING**

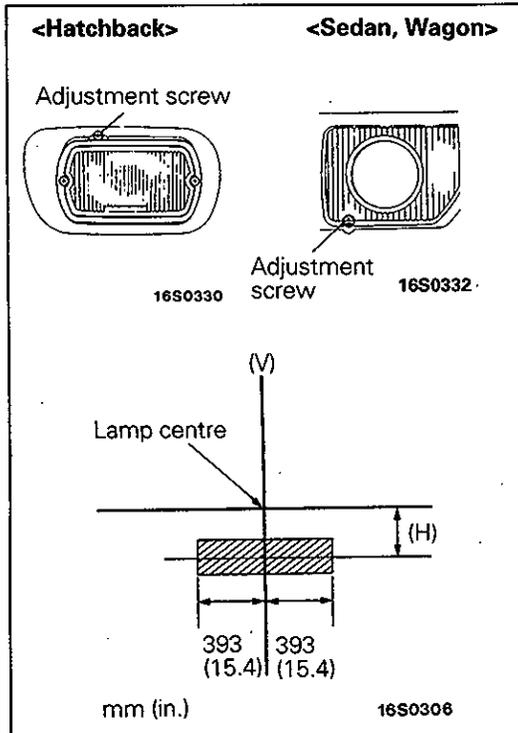


1. Remove the fog lamp bezel. (Refer to P.54-25) <Sedan, Hatchback>
2. Measure the centre of the fog lamps, as shown in the illustration.
3. Inflate the tyres to the specified pressures and remove the load from the vehicle (except a driver).





4. Set the distance between the screen and the centre of the fog lamps at 5 m (16.4 ft.).
5. With the engine running at 2,000 r/min., aim the fog lamp.



6. Check if the beam shining onto the screen is at the standard value.

**Standard value:**

**(Vertical direction)**

**100 mm (3.94 in.) below horizontal (H)**

**(Horizontal direction)**

**Deviation of light beam axis is within 393mm (15.4in.) to the left and right**

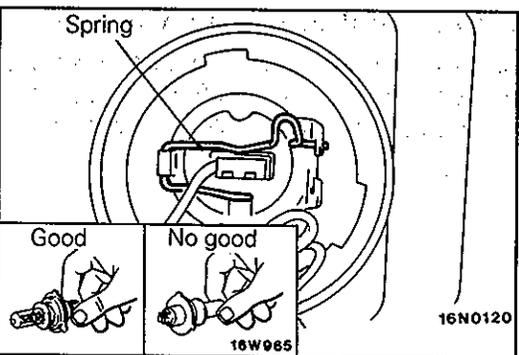
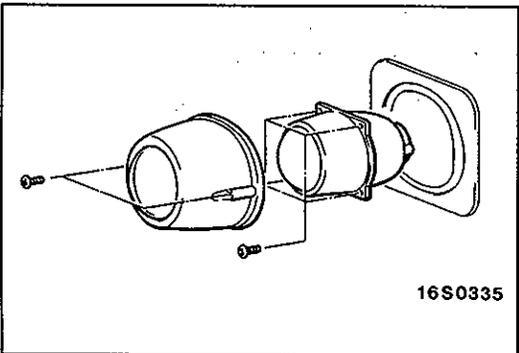
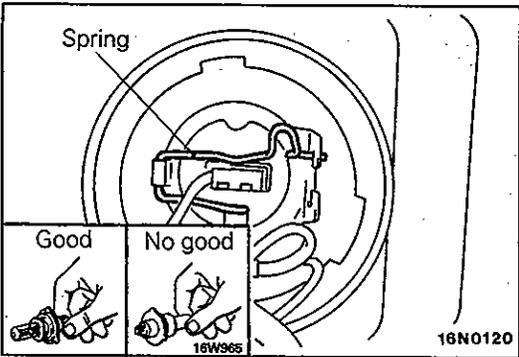
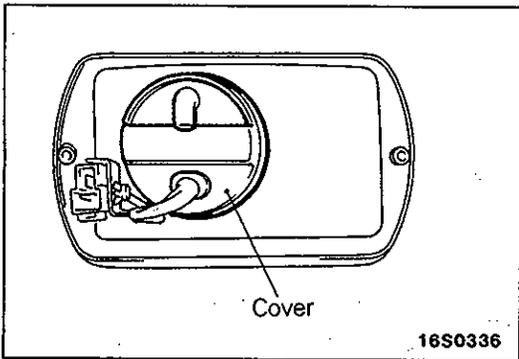
**NOTE**

The horizontal direction is non-adjustable. If the deviation of the light beam axis exceeds the standard value, check to be sure that the mounting location or some other point is not defective.

**Caution**

**When making the aiming adjustment, be sure to mask those lamps which are not being adjusted.**

NOTES



**REPLACEMENT OF REPLACEABLE BULB**

**Fog Lamp Bulb**

**<Hatchback>**

1. Remove the fog lamp (Refer to P.54-25.)
2. Disconnect the socket cover.

3. Remove the bulb attachment spring and pull out the bulb.

**Caution**

**Do not touch the surface of the bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.**

4. Install the socket cover securely.

**NOTE**

If the socket cover is not securely installed, the lens will be out of focus, or water will get inside the lamp unit, so the socket cover should be securely installed.

**<Sedan, Wagon>**

1. Remove the fog lamp bezel. (Refer to P.54-25.)
2. Remove the front cover and the lamp unit.

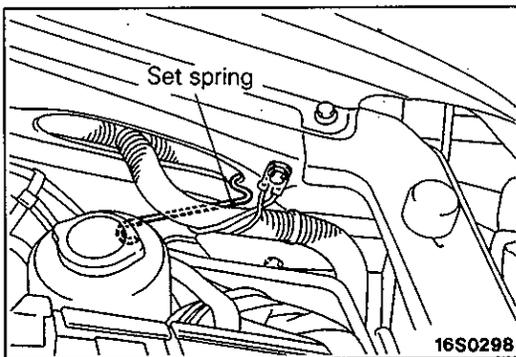
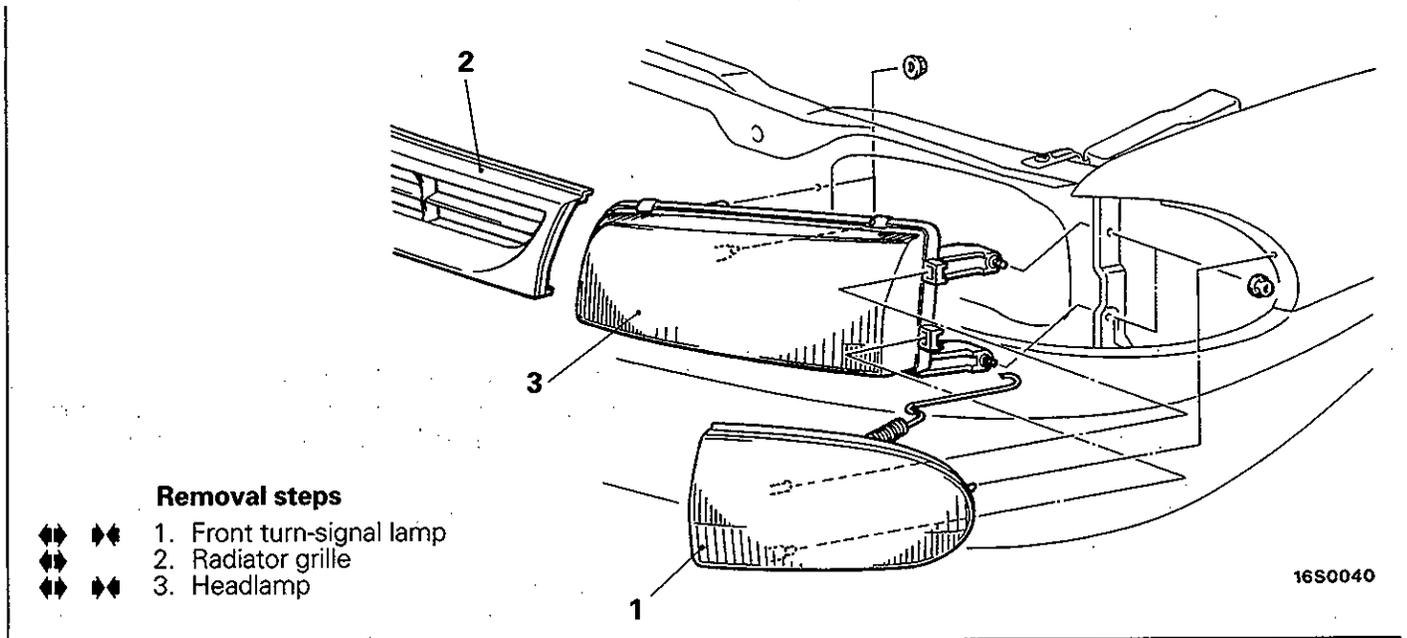
3. Remove the bulb attachment spring and pull out the bulb.

**Caution**

**Do not touch the surface of the bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.**

# HEADLAMP AND POSITION LAMP

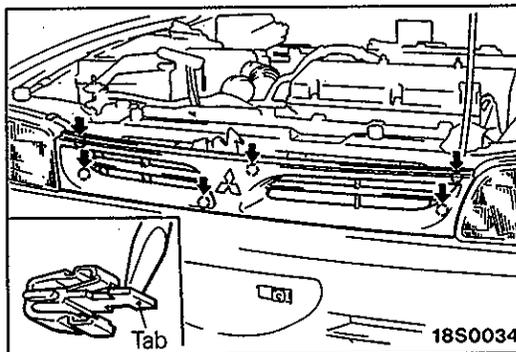
## REMOVAL AND INSTALLATION



### SERVICE POINTS OF REMOVAL

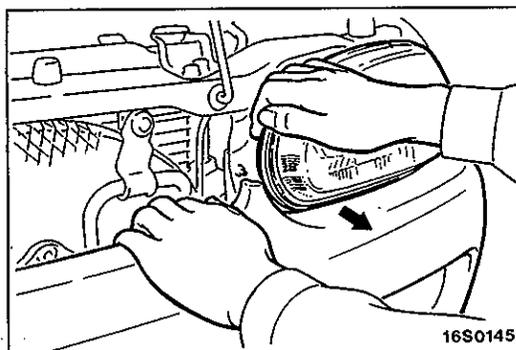
#### 1. REMOVAL OF FRONT TURN SIGNAL LAMP

Remove the set spring, and pull the front turn signal lamp forward to remove it.



#### 2. REMOVAL OF RADIATOR GRILLE <Sedan, Wagon>

Remove the radiator grille by pushing the tab of the radiator grille clips in the direction of arrows with a flattipped screwdriver, while lightly pulling the radiator grille towards you.

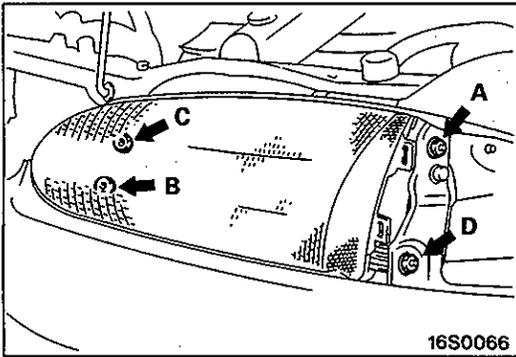


#### 3. REMOVAL OF HEADLAMP <Hatchback>

After removing the inside of the headlamp while pulling the bumper towards you as shown in the illustration, remove the outside, and then remove the headlamp.

#### NOTE

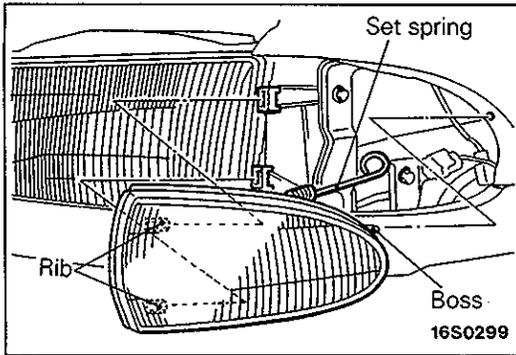
Remove the reservoir tank before removing the right side headlamp. (Refer to GROUP 14 – Radiator)



**SERVICE POINTS OF INSTALLATION**

**3. INSTALLATION OF HEADLAMP**

Tighten the mounting nuts in the order A, B, C and D.



**1. INSTALLATION OF FRONT TURN SIGNAL LAMP**

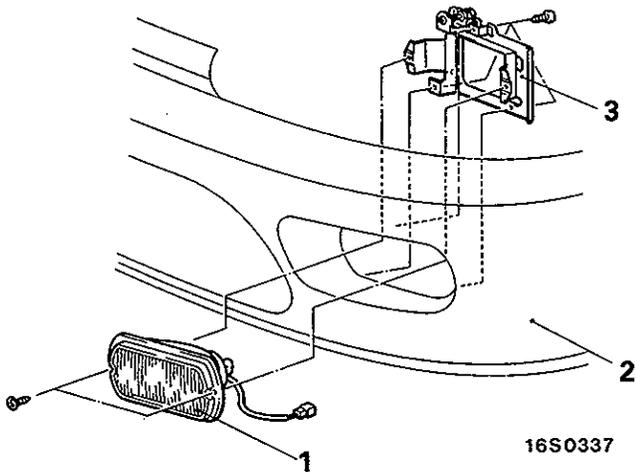
- (1) After aligning the positioning boss of the front turn signal lamp with the fender insertion hole, align the ribs with the headlamp insertion holes.
- (2) While pressing in the front turn signal lamp towards the rear of the vehicle, hook the set spring to the fender shield inner to secure the front turn signal lamp to the vehicle body.

**FRONT FOG LAMP**

**REMOVAL AND INSTALLATION**

E54GCAD

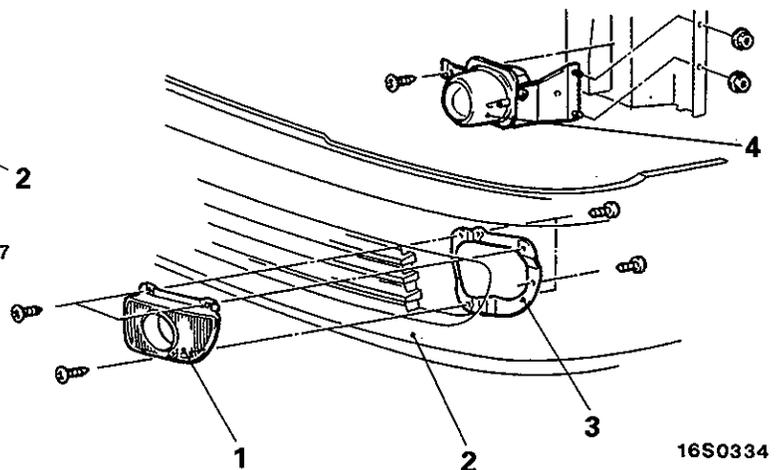
**<Hatchback>**



**Removal steps <Hatchback>**

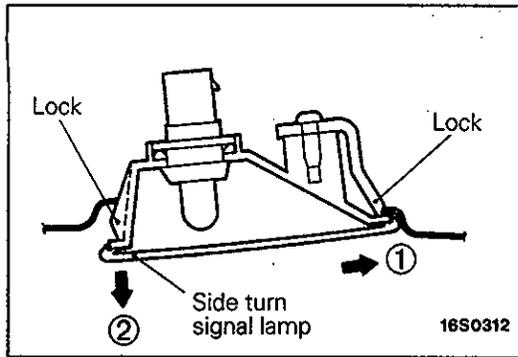
1. Front fog lamp
2. Front bumper (Refer to GROUP 51 – Bumper)
3. Bracket

**<Sedan, Wagon>**



**Removal steps <Sedan, Wagon>**

1. Fog lamp bezel
2. Front bumper (Refer to GROUP 51 – Bumper)
3. Fog lamp bezel bracket
4. Fog lamp



## SIDE TURN SIGNAL LAMP

E54GZAC

### SERVICE POINTS OF REMOVAL

Move the side turn signal lamp in the order of the numbered arrows to remove the lock, and then remove the side turn signal lamp.

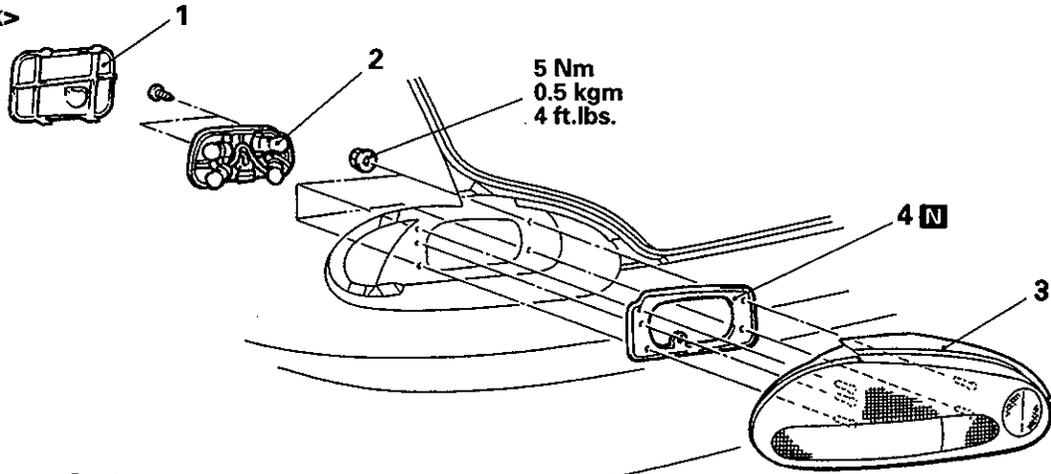
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NOTES

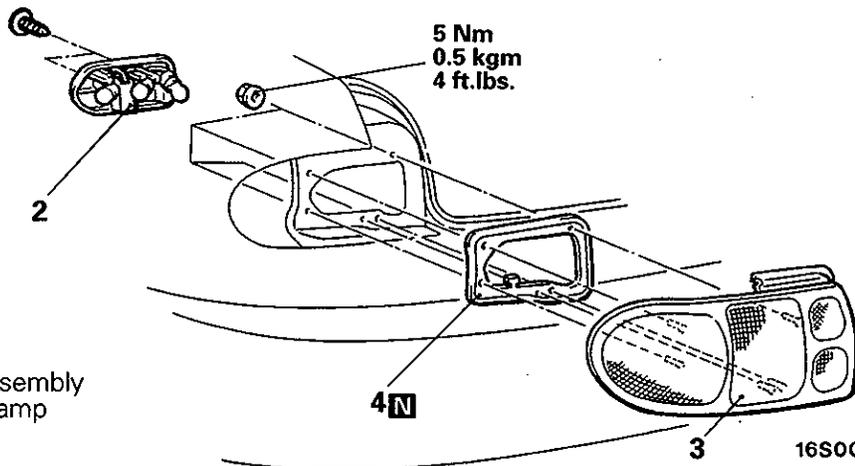
# REAR COMBINATION LAMP

## REMOVAL AND INSTALLATION <HATCHBACK, SEDAN>

<Hatchback>



<Sedan>



**Removal steps**

1. Rid
2. Socket and bulb assembly
3. Rear combination lamp
4. Gasket



16S0302

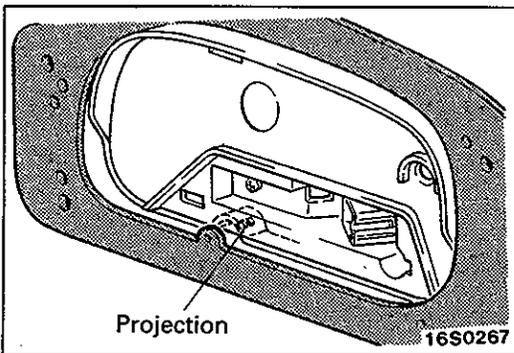
16S0055

### SERVICE POINTS OF INSTALLATION

#### 4. INSTALLATION OF GASKET

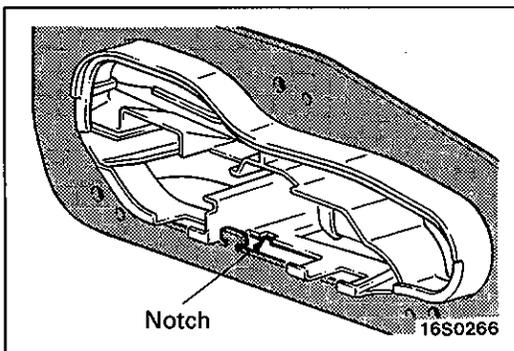
<Hatchback>

Securely insert the gasket onto the lamp unit projection.

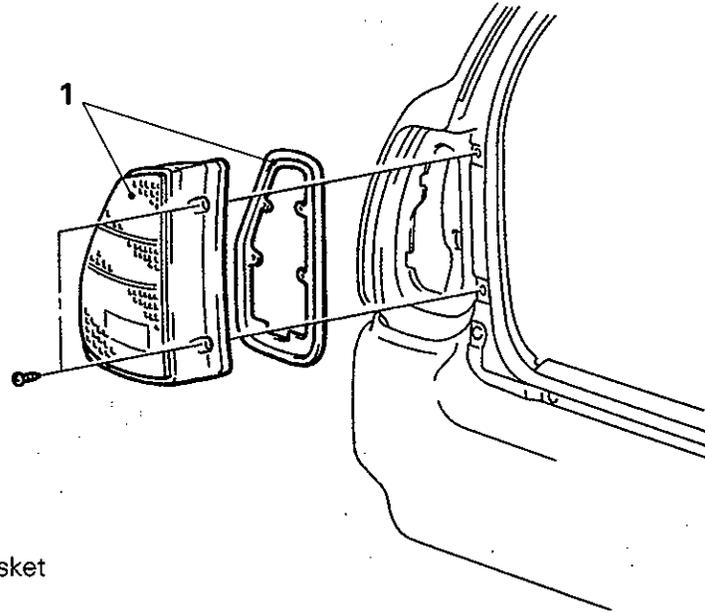


<Sedan>

Securely insert the gasket onto the lamp unit notch.



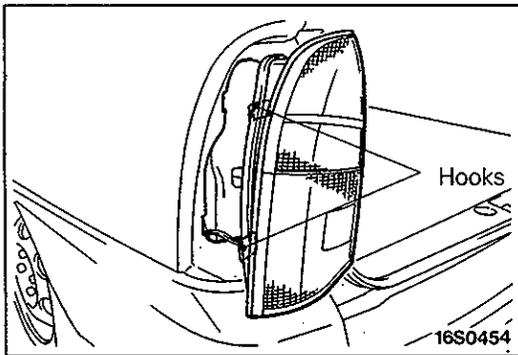
REMOVAL AND INSTALLATION <WAGON>



**Removal steps**

- ◆◆ 1. Rear combination lamp and gasket

16S0458



**SERVICE POINTS OF INSTALLATION**

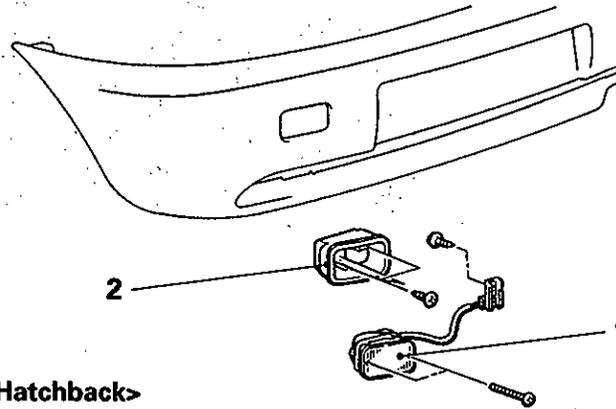
**1. INSTALLATION OF REAR COMBINATION LAMP**

Install the rear combination lamp hooks to the body, and then tighten the screws.

# REAR FOG LAMP

## REMOVAL AND INSTALLATION

### <Hatchback>

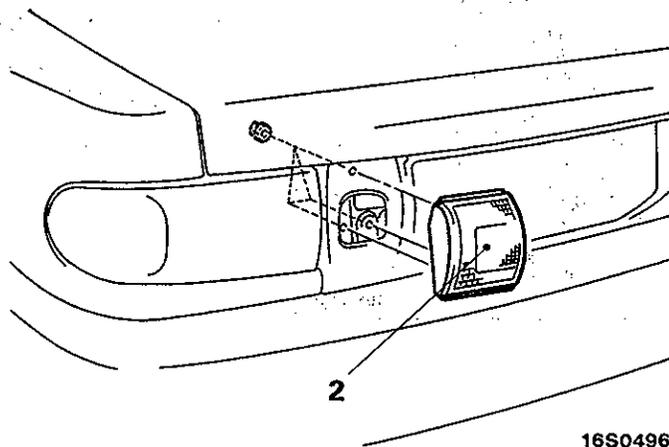


#### Removal steps <Hatchback>

1. Rear fog lamp
2. Rear fog lamp bezel

16S0499

### <Sedan>

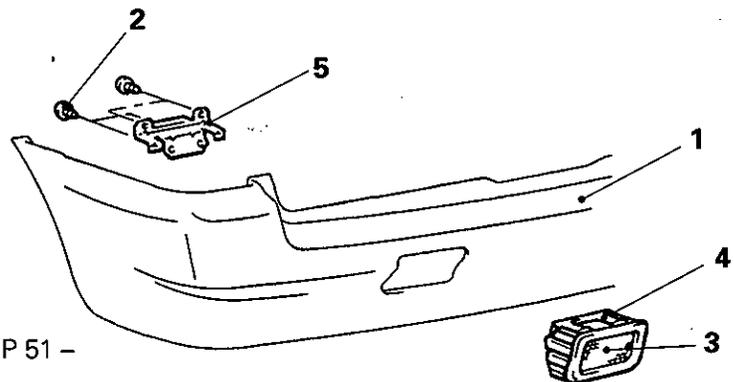


#### Removal <Sedan>

2. Rear fog lamp

16S0496

### <Wagon>



#### Removal steps <Wagon>

1. Rear bumper face (Refer to GROUP 51 – Bumper)
2. Rear fog lamp mounting screw
3. Rear fog lamp
4. Bracket (Upper)
5. Bracket (Lower)

16S0498

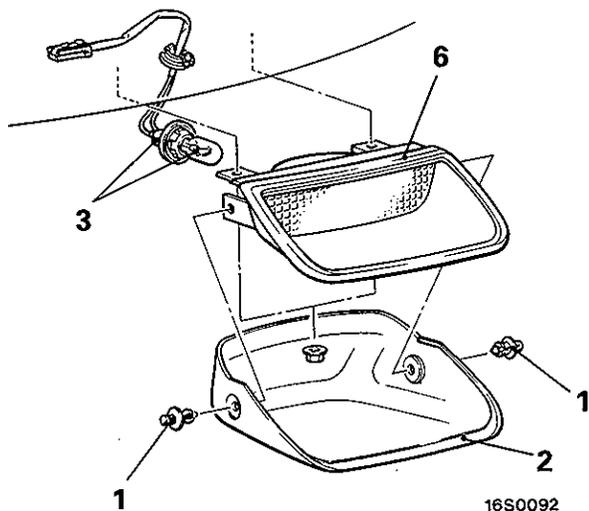
# HIGH MOUNTED STOP LAMP

## REMOVAL AND INSTALLATION

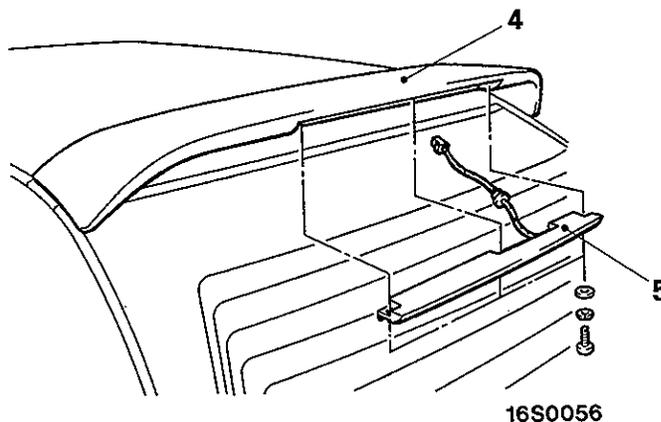
E54GUA1

### <Hatchback>

#### <Vehicles without roof spoiler>

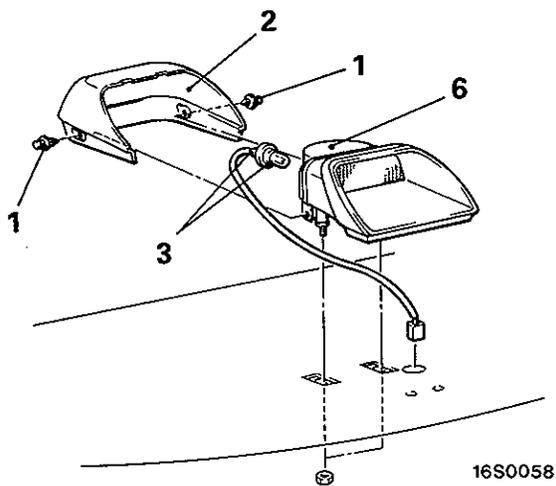


#### <Vehicles with roof spoiler>

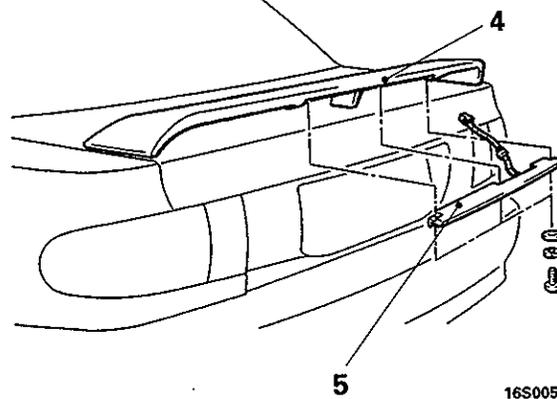


### <Sedan>

#### <Vehicles without rear spoiler>



#### <Vehicles with rear spoiler>



#### Removal steps

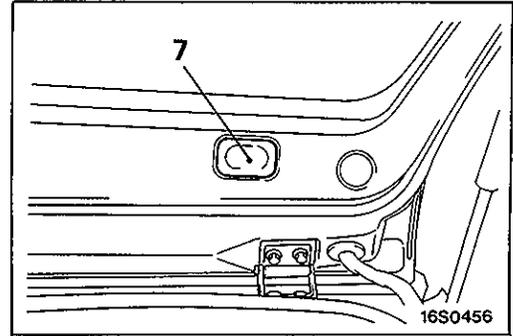
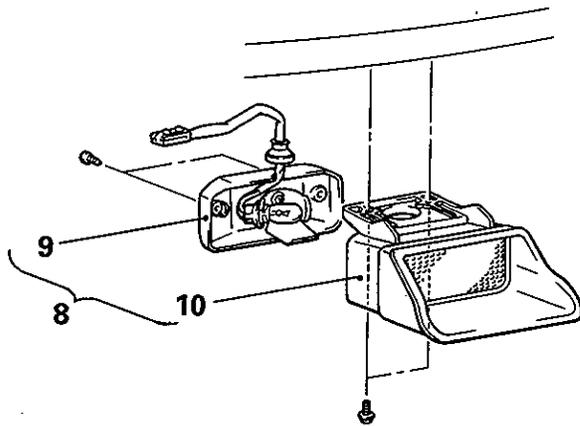
#### <Vehicles without roof spoiler and rear spoiler>

- ◆◆ ◆◆ 1. Clip
- 2. Cover
- 3. Socket and bulb assembly
- 6. High mounted stop lamp

#### <Vehicles with roof spoiler or rear spoiler>

- ◆◆ ◆◆ 4. Roof spoiler or rear spoiler  
(Refer to GROUP 51 – Aero parts)
- ◆◆ ◆◆ 5. High mounted stop lamp

<Wagon>  
<LHD>

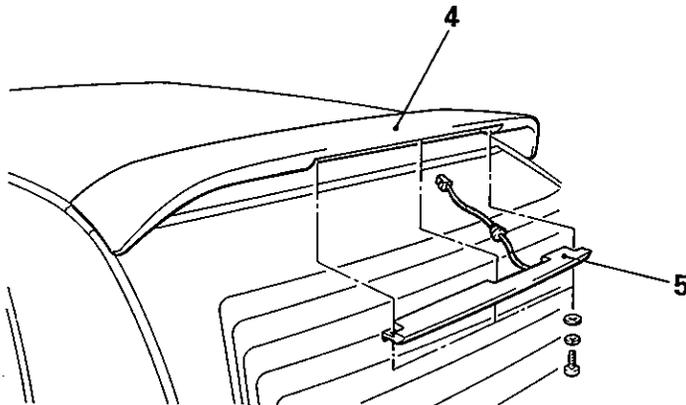


**Removal steps**

16S0459

- 7. Tape
- 8. High mounted stop lamp
- 9. Bulb and socket assembly
- 10. High mounted stop lamp housing

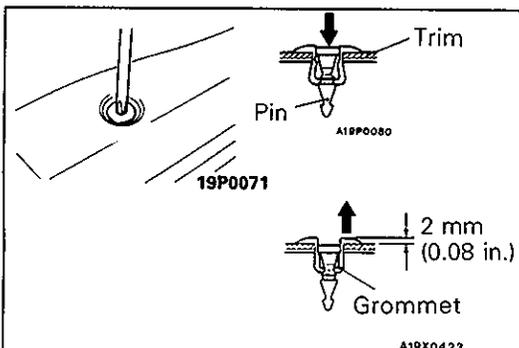
<RHD>



16S0056

**Removal steps**

- 4. Roof spoiler or rear spoiler  
(Refer to GROUP 51 – Aero parts)
- 5. High mounted stop lamp



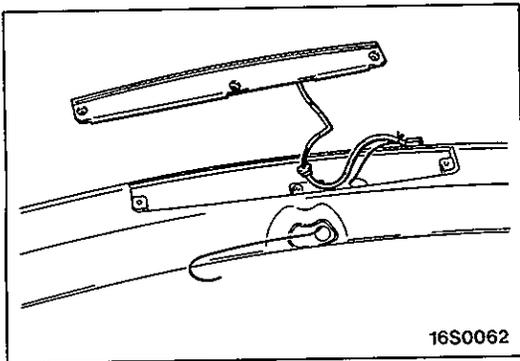
**SERVICE POINTS OF REMOVAL**

**1. REMOVAL OF CLIP**

- (1) Use a cross-tip (+) screwdriver to push inward the pin (at the center of the clip) to a depth of about 2 mm (0.08 in.)
- (2) Pull the clip outward to remove it

**Caution**

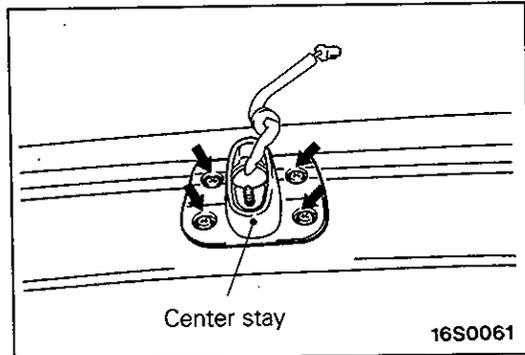
**Do not push the pin inward more than necessary because it may damage the grommet, or the pin may fall in, if pushed too far.**



5. REMOVAL OF HIGH MOUNTED STOP LAMP

<Hatchback>

To make wiring easier when installing, tie a cord to the end of the wiring harness, and remove the high mounted stop lamp.

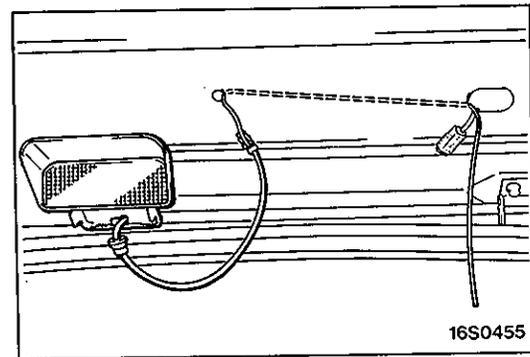


<Sedan>

After removing the rear spoiler center stay mounting screws, remove the high mounted stop lamp.

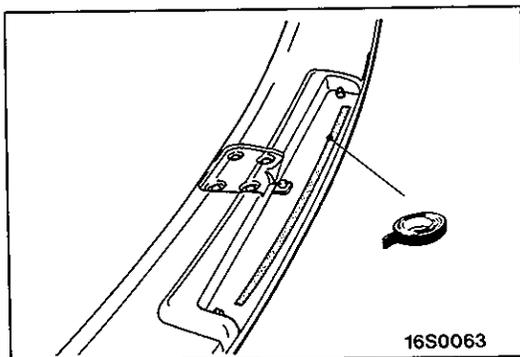
NOTE

The rear spoiler and high mounted stop lamp are attached together with both-sided tape.



8. REMOVAL OF HIGH MOUNTED STOP LAMP

Tie a cord to the end of the harness to facilitate wiring during installation, and remove the high mounted stop lamp.



SERVICE POINTS OF INSTALLATION

5. INSTALLATION OF HIGH MOUNTED STOP LAMP

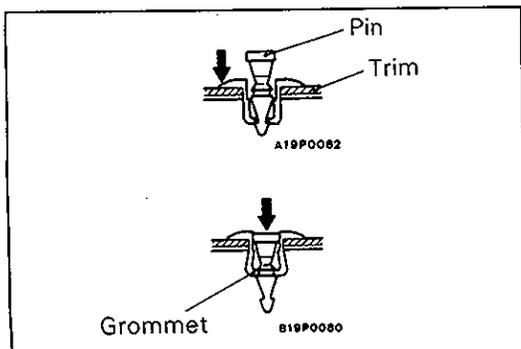
<Sedan>

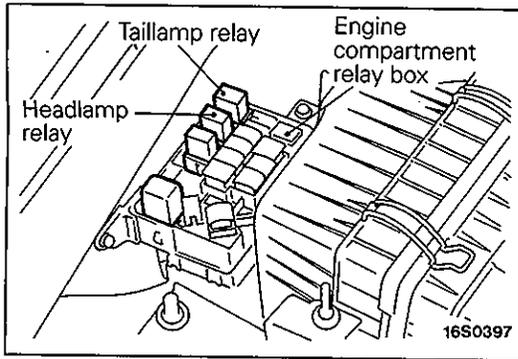
After removing any both-sided tape still adhering to the high mounted stop lamp or rear spoiler, attach the specified both-sided tape.

**Adhesive tape: Both-sided tape  
12 mm (0.47 in.) wide**

1. INSTALLATION OF CLIP

- (1) With the pin pulled out, insert the clip into the hole in the trim.
- (2) Push the pin inward until the pin's head is flush with the grommet.
- (3) Check whether the trim is secure.





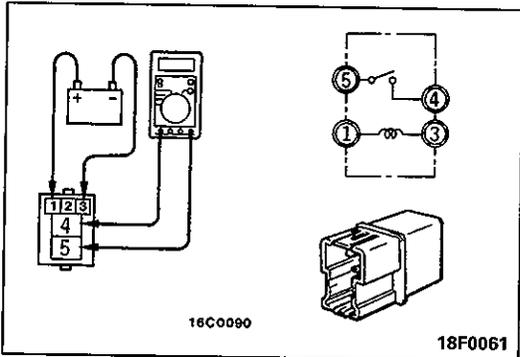
## RELAY

E54GIAU

### INSPECTION

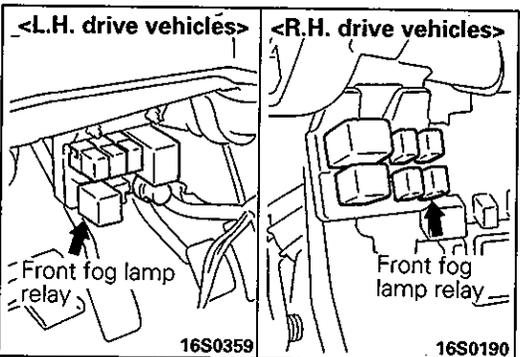
#### HEADLAMP RELAY, TAIL LAMP RELAY

- (1) Remove the headlamp relay and tail lamp relay from the engine compartment relay box.



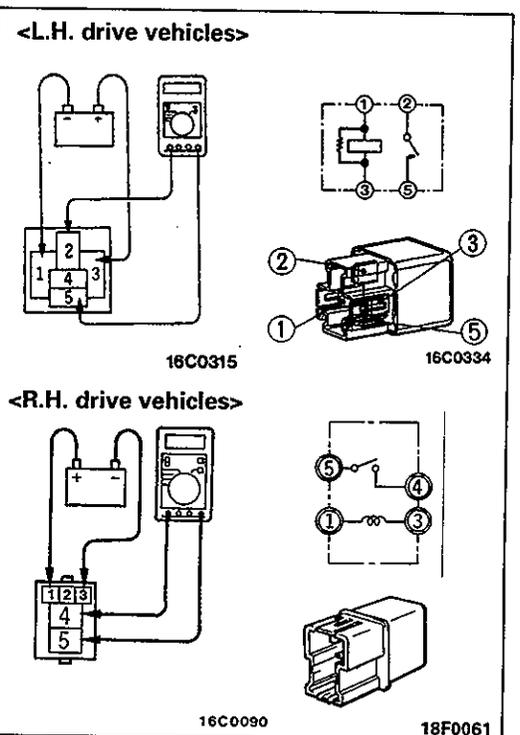
- (2) Apply battery voltage to terminal ①, and check the continuity between the terminals when terminal ③ is earthed.

Power is supplied	④ – ⑤ terminals	Continuity
Power is not supplied	④ – ⑤ terminals	No continuity
	① – ③ terminals	Continuity



#### FRONT FOG LAMP RELAY

- (1) Remove the instrument lower panel. (Refer to P.54-5.)
- (2) Remove the front fog lamp relay from the interior relay box.
- (3) Inspect by the following procedure.



#### <L.H. drive vehicles>

Apply battery voltage to terminal ①, and check the continuity between the terminals when terminal ③ is earthed.

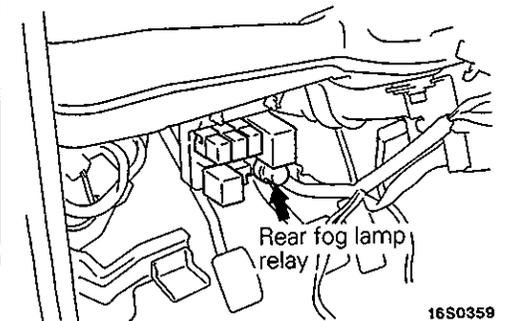
Power is supplied	② – ⑤ terminals	Continuity
Power is not supplied	② – ⑤ terminals	No continuity
	① – ③ terminals	Continuity

#### <R.H. drive vehicles>

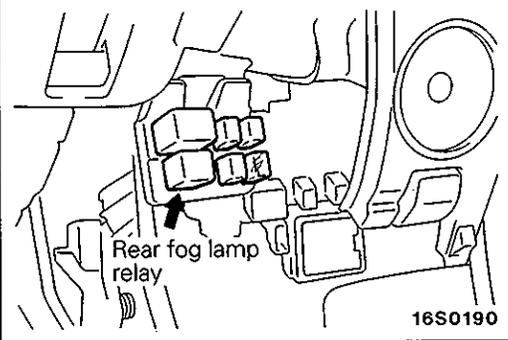
Apply battery voltage to terminal ①, and check the continuity between the terminals when terminal ③ is earthed.

Power is supplied	④ – ⑤ terminals	Continuity
Power is not supplied	④ – ⑤ terminals	No continuity
	① – ③ terminals	Continuity

<L.H. drive vehicles>



<R.H. drive vehicles>

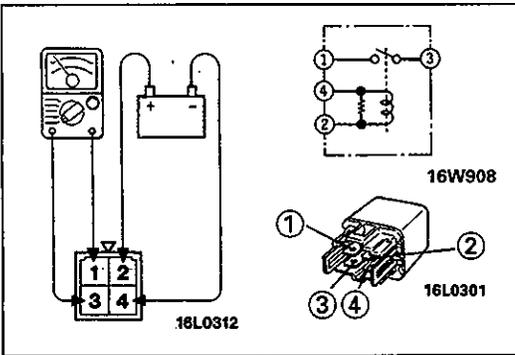


**REAR FOG LAMP RELAY**

- (1) Remove the instrument lower panel. (Refer to P.54-5.)
- (2) Remove the rear fog lamp relay from the interior relay box.

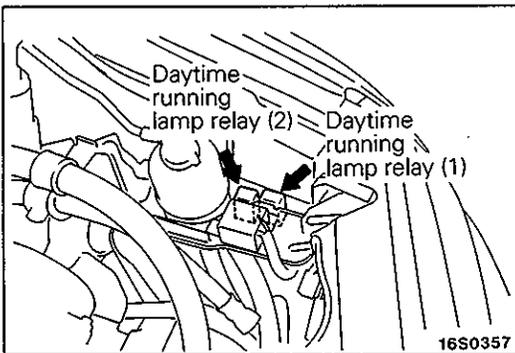
- (3) Apply battery voltage to terminal ②, and check the continuity between the terminals when terminal ④ is earthed.

Power is supplied	① – ③ terminals	Continuity
Power is not supplied	① – ③ terminals	No continuity
	② – ④ terminals	Continuity



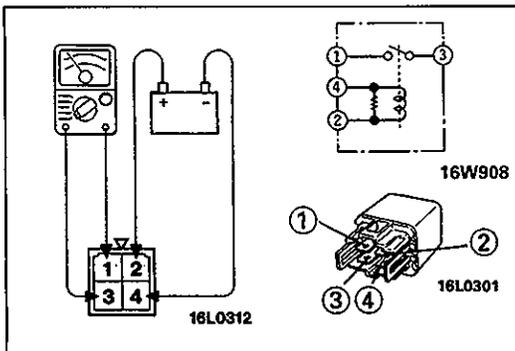
**DAYTIME RUNNING LAMP RELAY (1), (2)**

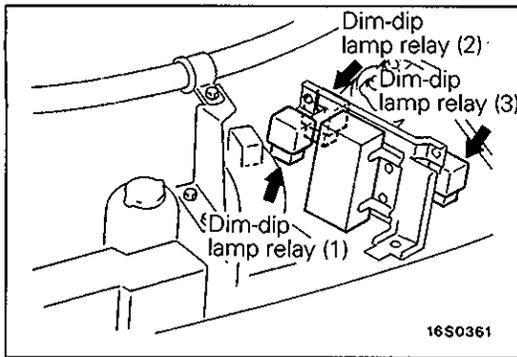
- (1) Remove the daytime running lamp relay (1) and (2).



- (2) Apply battery voltage to terminal ②, and check the continuity between the terminals when terminal ④ is earthed.

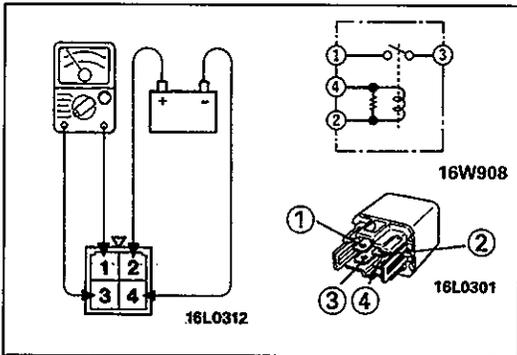
Power is supplied	① – ③ terminals	Continuity
Power is not supplied	① – ③ terminals	No continuity
	② – ④ terminals	Continuity





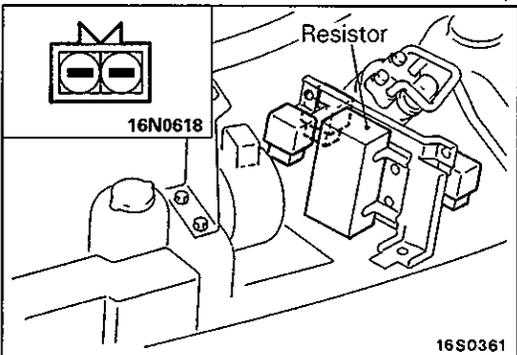
**DIM-DIP LAMP RELAY (1), (2), (3) <R.H. drive vehicles>**

(1) Remove the dim-dip lamp relay (1), (2) and (3).



(2) Apply battery voltage to terminal ②, and check the continuity between the terminals when terminal ④ is earthed.

Power is supplied	① – ③ terminals	Continuity
Power is not supplied	① – ③ terminals	No continuity
	② – ④ terminals	Continuity



**RESISTOR <R.H. drive vehicle>**

**INSPECTION**

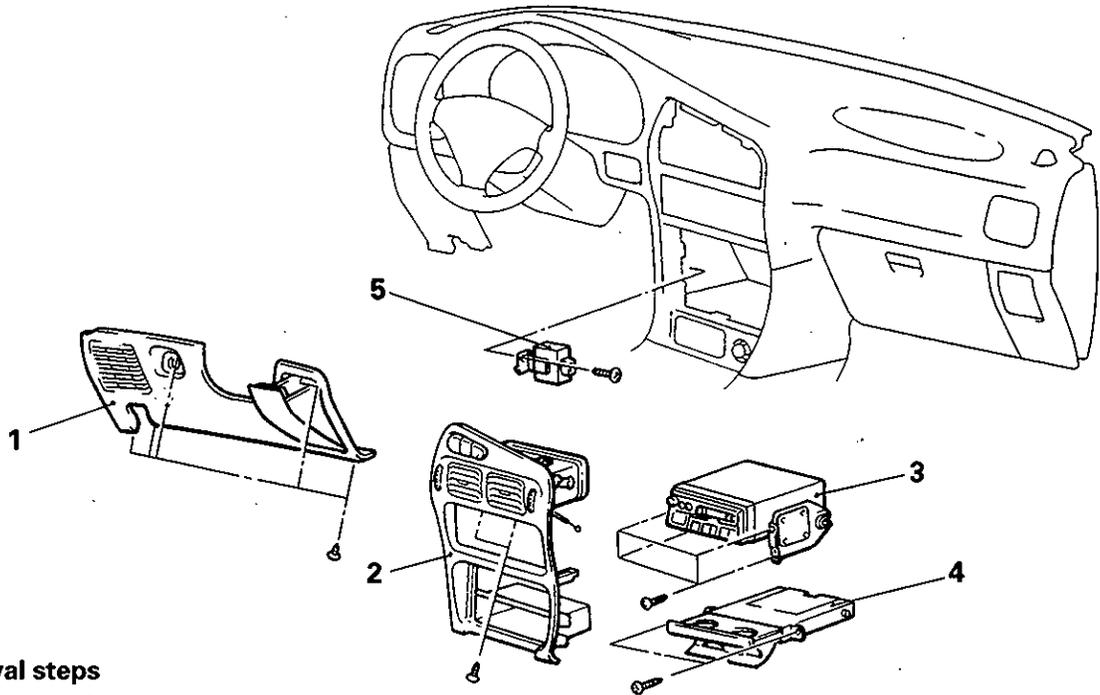
- (1) Remove the resistor connector.
- (2) Connect an ohmmeter to the resistor connector terminal and check the resistance value.

**Standard value: Approx. 1 Ω**

**LIGHTING MONITOR BUZZER**

E54GRAB

**REMOVAL AND INSTALLATION**

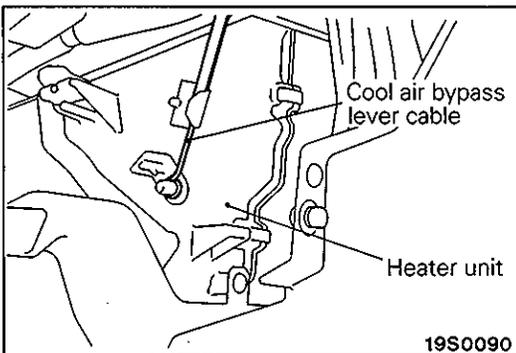


**Removal steps**



1. Instrument lower panel
2. Air outlet center panel assembly
3. Radio
4. Cup holder
5. Lighting monitor buzzer

16S0283

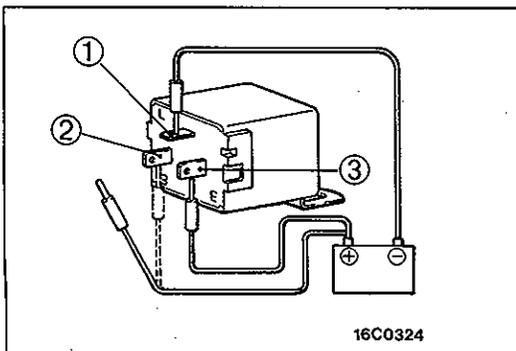


19S0090

**SERVICE POINTS OF REMOVAL**

**2. REMOVAL OF AIR OUTLET CENTER PANEL ASSEMBLY**

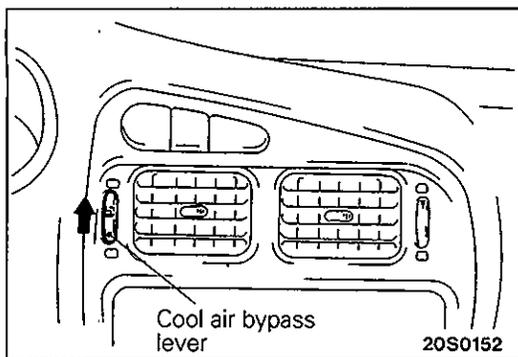
- (1) Remove the cool air bypass lever cable of the air outlet center panel assembly at the heater unit side.
- (2) Remove the air outlet center panel assembly mounting screws, and remove the air outlet center panel assembly.



16C0324

**INSPECTION**

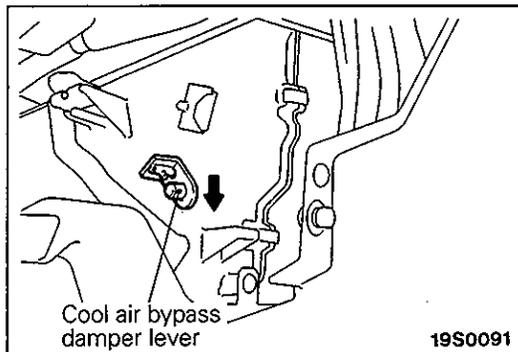
- (1) Check to be sure that the buzzer sounds when battery voltage is applied to terminal ③ and terminal ① is earthed.
- (2) Check to be sure that the buzzer stops sounding when battery voltage is applied to terminal ②.



## SERVICE POINTS OF INSTALLATION

### 2. INSTALLATION OF AIR OUTLET CENTER PANEL ASSEMBLY

- (1) Install the air outlet center panel assembly to the instrument panel.
- (2) Turn the cool air bypass lever of the air outlet center panel assembly fully upward (in the direction of the arrow).

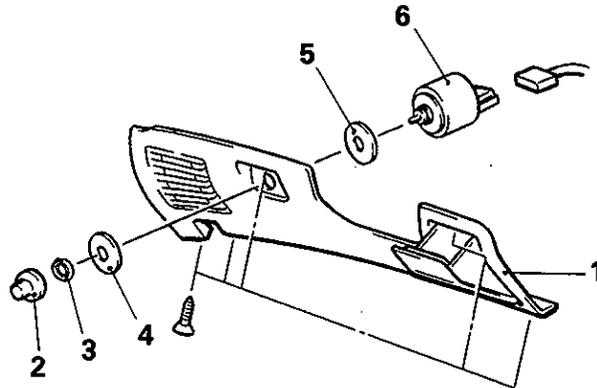


- (3) Turn the cool air bypass damper lever at the heater unit side fully downward (in the direction of the arrow), and install the cool air bypass lever cable.

## HEADLAMP LEVELING SWITCH

E54GYAG

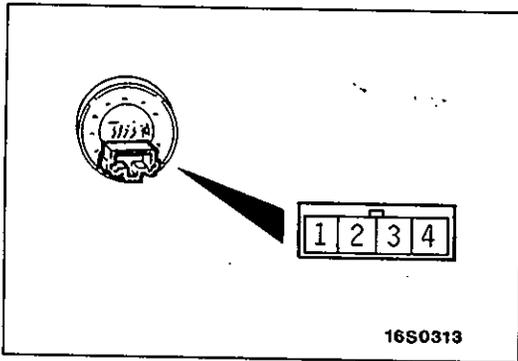
### REMOVAL AND INSTALLATION



#### Removal steps

1. Instrument lower panel
2. Knob
3. Nut
4. Plate
5. Spacer
6. Headlamp leveling switch

16S0324



16S0313

### INSPECTION

Operate the switch and measure the resistance at each switch position.

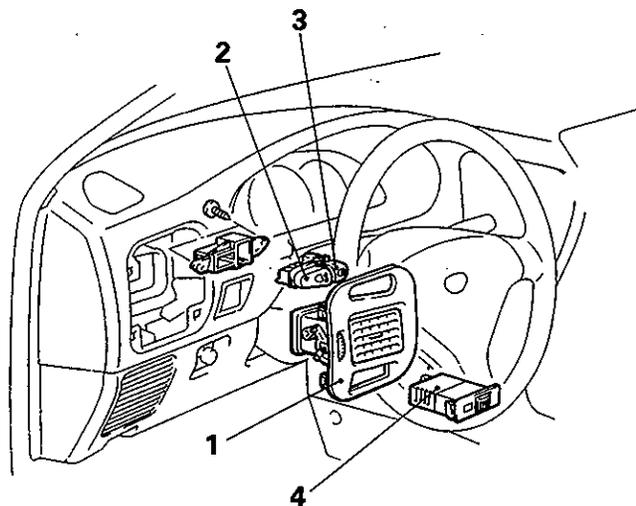
#### Between terminals 1 and 2:

Switch position	0	1	2	3	4
Resistance $\Omega$	120	300	620	1,100	2,000

## FRONT FOG LAMP SWITCH, REAR FOG LAMP SWITCH AND RHEO-STAT

E54GWAD

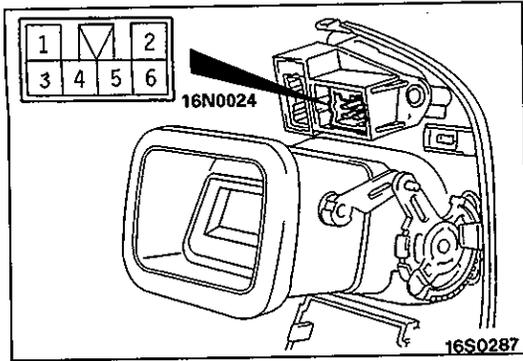
### REMOVAL AND INSTALLATION



#### Removal steps

1. Air outlet panel assembly
2. Front fog lamp switch
3. Rear fog lamp switch
4. Rheostat

16S0322



**INSPECTION**

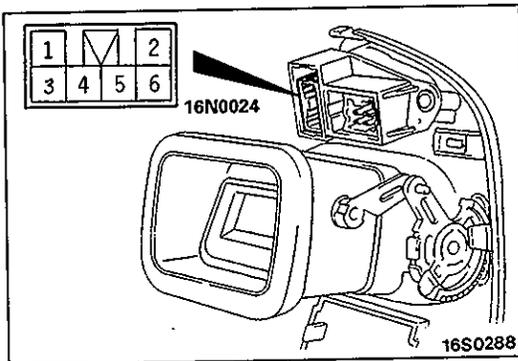
**FRONT FOG LAMP SWITCH**

Operate the switch and check for continuity between the terminals.

Terminal No.	1	2	3	6	4	5
Switch position						
OFF						
ON					Illumination lamp	

**NOTE**

○—○ indicates that there is continuity between the terminals.



**REAR FOG LAMP SWITCH**

Operate the switch and check for continuity between the terminals.

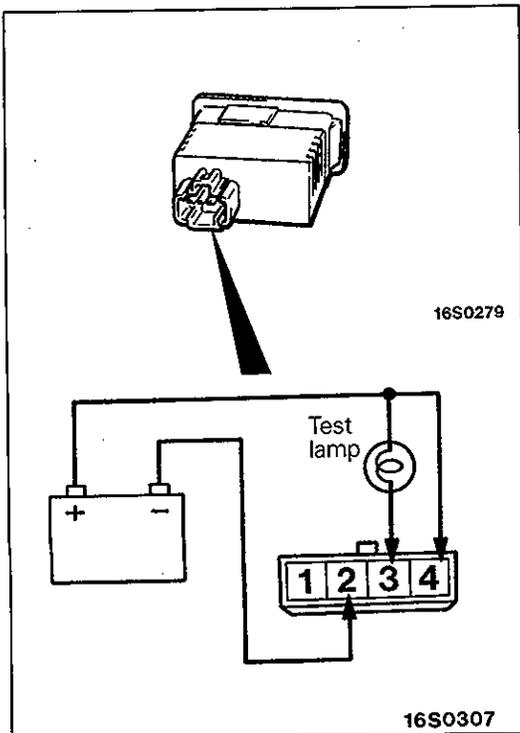
Terminal No.	2	6	1	5
Switch position				
OFF				
ON			Illumination lamp	

**NOTE**

○—○ indicates that there is continuity between the terminals.

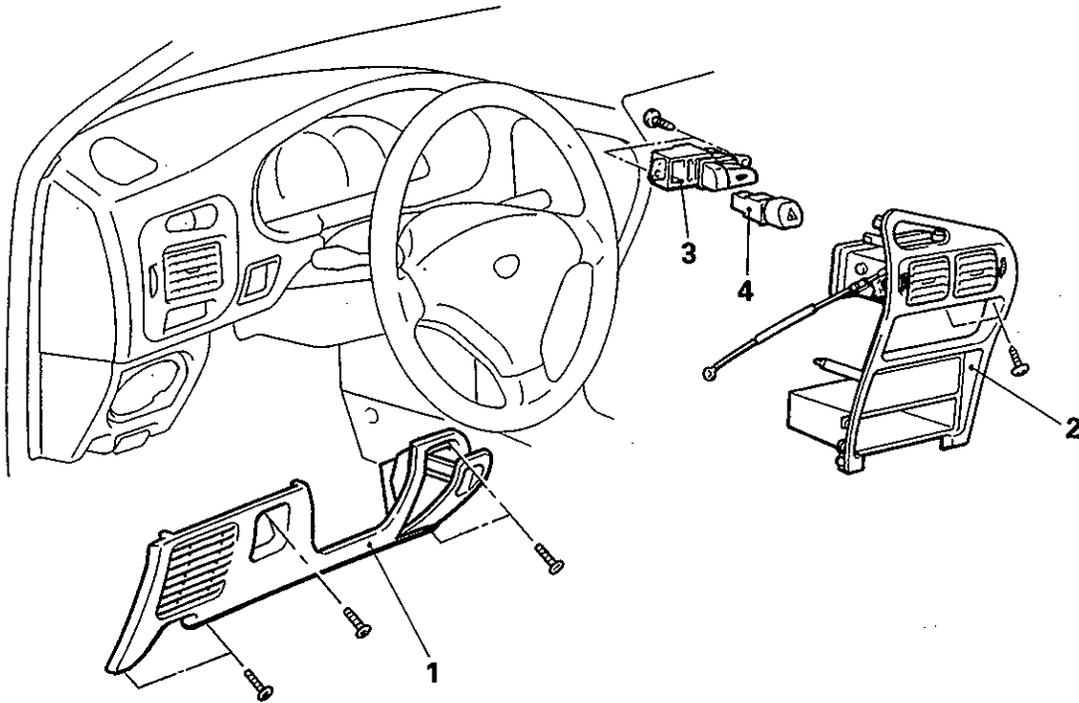
**RHEOSTAT**

1. Connect the battery and the test bulb (40W) as shown in the illustration.
2. Operate the rheostat, and if the brightness changes smoothly without switching off, then the rheostat function is normal.



E54GYAH

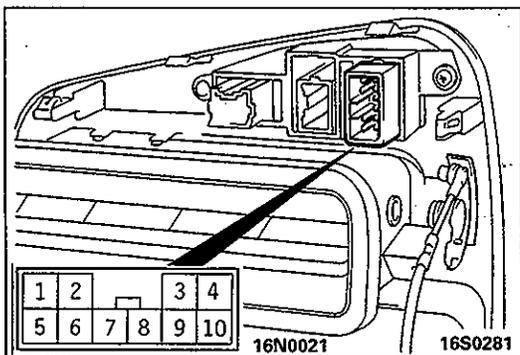
# HAZARD LAMP SWITCH REMOVAL AND INSTALLATION



16S0321

### Removal steps

1. Instrument lower panel
2. Air outlet center panel assembly (Refer to P.54-31.)
3. Switch holder
4. Hazard lamp switch



### INSPECTION

Operate the switch and check for continuity between the terminals.

Terminal No.	1	2	3	4	5	6	7	8	9	10
Switch position										
OFF					○	○	○	○	○	○
ON	○	○	○	○	○	○			Illumination lamp	

### NOTE

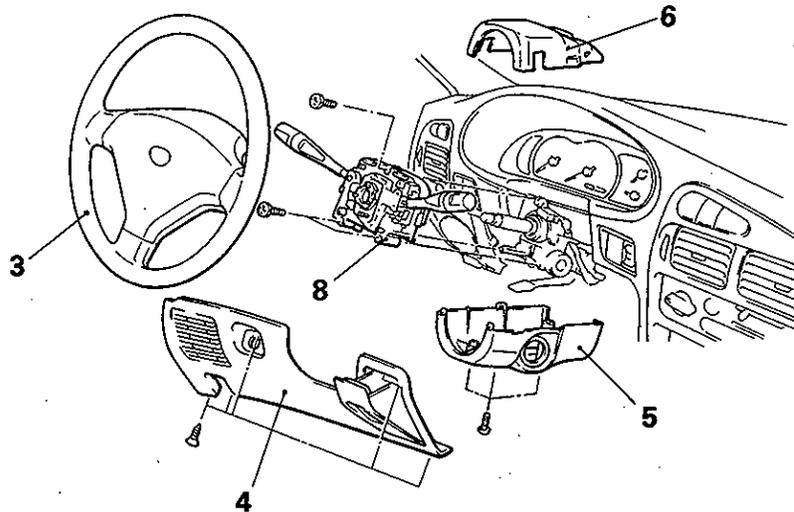
○—○ indicates that there is continuity between the terminals.

# COLUMN SWITCH

## REMOVAL AND INSTALLATION

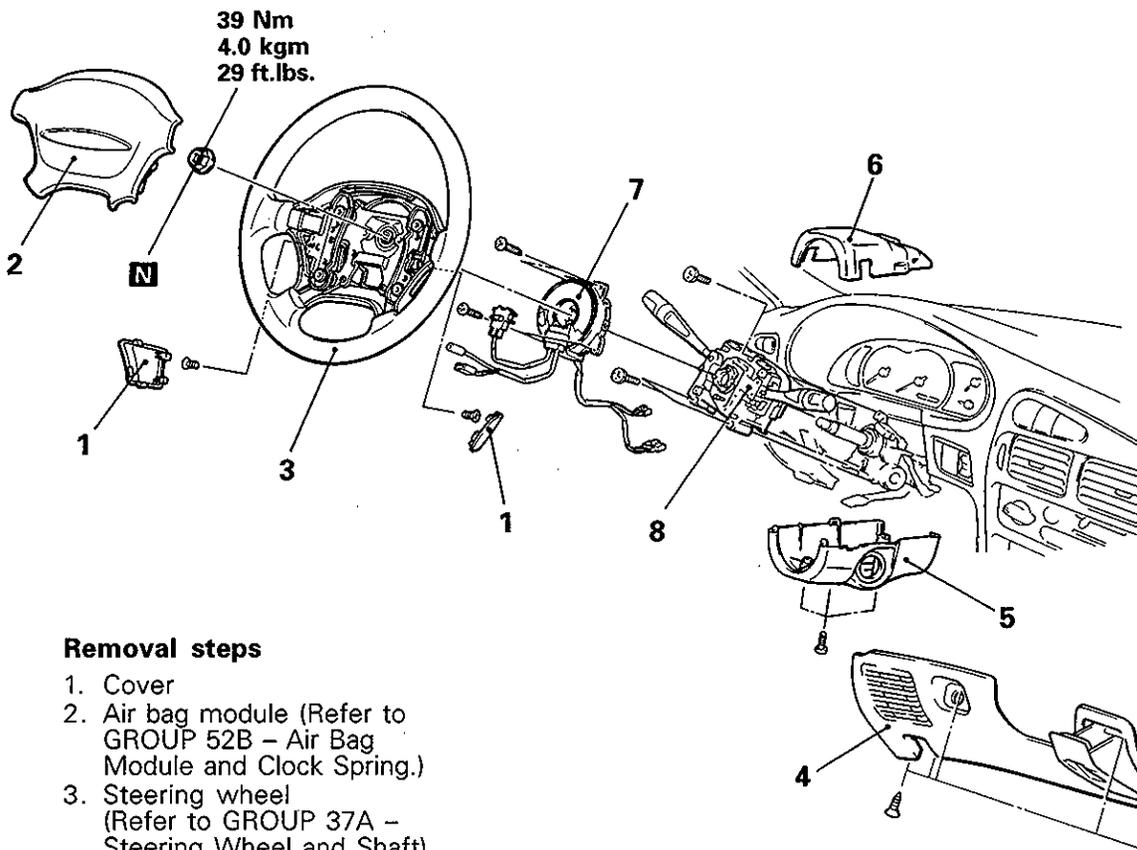
E54HH-

<Vehicles without SRS>



16S0326

<Vehicles with SRS>



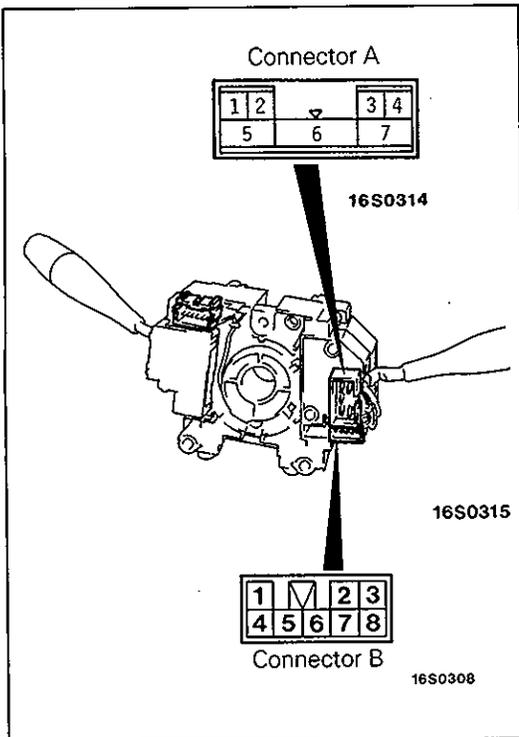
### Removal steps

1. Cover
2. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring.)
3. Steering wheel (Refer to GROUP 37A – Steering Wheel and Shaft)
4. Instrument lower panel
5. Column cover lower
6. Column cover upper
7. Clock spring (Refer to GROUP 52B – Air Bag Module and Clock Spring)
8. Column switch

16S0637

### CAUTION: SRS

Before removal of air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring



**INSPECTION**

**<L.H. drive vehicles>**

Operate the switch and check for continuity between the terminals.

Terminal No.		Connector A						Connector B			
		1	2	3	4	5	6	7	5	7	8
LIGHTING	OFF										
	TAIL		○—○								
	HEAD		○—○—○								
DIMMER/ PASSING	LOWER						○—○				
	UPPER					○—○					
	PASSING	○—○	○—○			○					
TURN SIGNAL	RH								○—○		
	OFF										
	LH									○—○	

**NOTE**

○—○ indicates that there is continuity between the terminals.

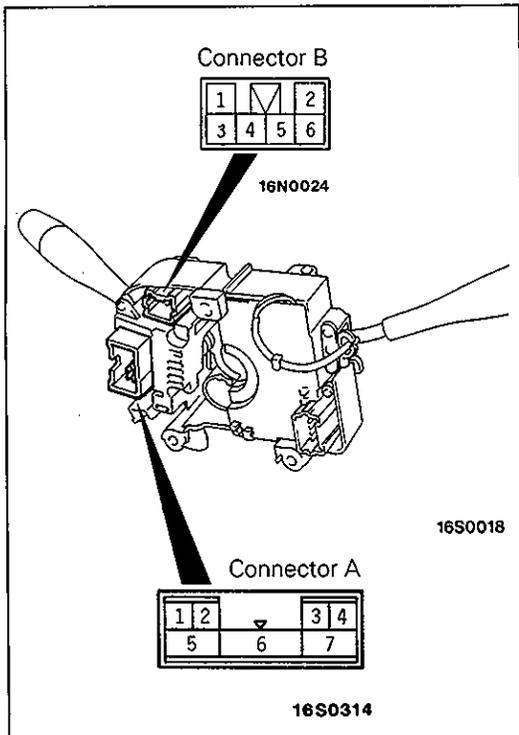
**WIPER AND WASHER SWITCH**

Refer to GROUP 51 – Windshield Wiper and Washer.

**HEADLAMP WASHER SWITCH**

Refer to GROUP 51 – Headlamp Washer.

NOTES



<R.H. drive vehicles>

Operate the switch and check for continuity between the terminals.

Terminal No.		Connector A					Connector B				
		1	2	3	4	5	6	7	4	5	6
LIGHTING	OFF										
	TAIL	○	○								
	HEAD	○	○	○	○	○	○				
DIMMER/ PASSING	LOWER						○	○			
	UPPER					○	○	○			
	PASSING				○	○	○	○			
TURN SIGNAL	RH								○	○	
	OFF										
	LH									○	○

NOTE

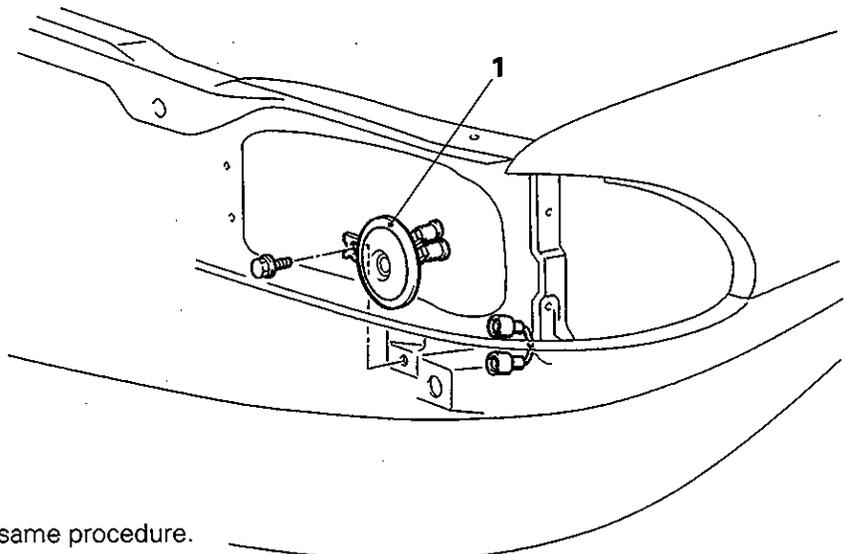
○—○ indicates that there is continuity between the terminals.

**WIPER AND WASHER SWITCH**

Refer to GROUP 51 – Windshield Wiper and Washer.

**HORN SYSTEM  
REMOVAL AND INSTALLATION**

E54IPAN



**Removal steps**

- Headlamp (Refer to P.54-24.)
- 1. Horn

NOTE

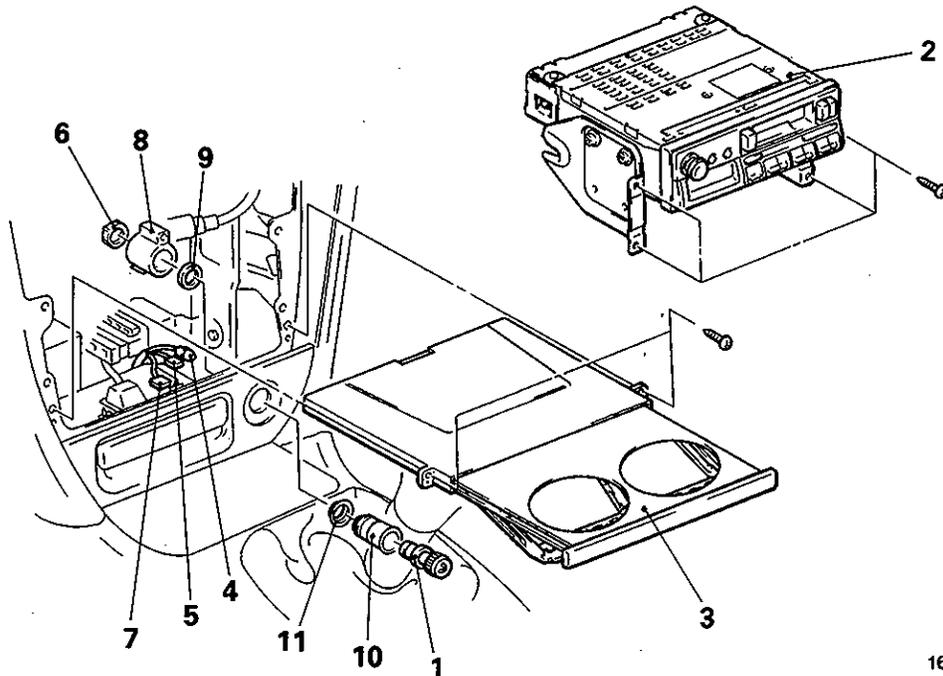
Remove the horn at the L.H. side by the same procedure.

16S0297

# CIGARETTE LIGHTER

E54JH-

## REMOVAL AND INSTALLATION



16S0329

### Removal steps

- |   |                |
|---|----------------|
| 1. Plug                                     | 8. Socket case |
| 2. Radio and tape player                    | 9. Plate       |
| 3. Cup holder                               | 10. Socket     |
| 4. Cigarette lighter illumination lamp      | 11. Protector  |
| 5. Cigarette lighter power supply connector |                |
| 6. Fixing ring                              |                |
| 7. Earth connector                          |                |

### INSPECTION

E54JJAD

- Take out the plug, and check for a worn edge on the element spot connection, and for shreds of tobacco or other material on the element.
- Using a circuit tester, check the continuity of the element.

### CAUTIONS FOR USE OF THE CIGARETTE LIGHTER SOCKET AS AUXILIARY POWER SOURCE

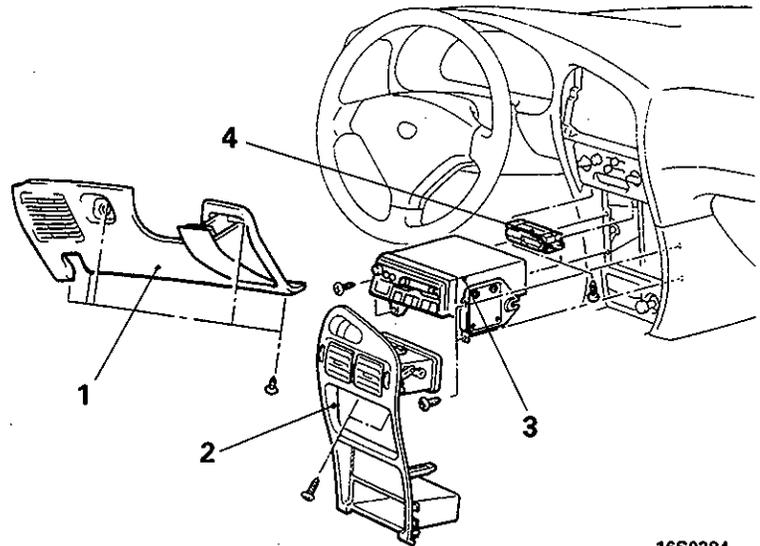
1. When using a "plug-in" type of accessory, do not use anything with a load of more than 120W.
2. It is recommended that only the lighter be inserted in the receptacle.  
Use of "plug-in" type accessories may damage the receptacle and result in poor retention of the lighter.
3. The specified load should be strictly observed, because overloaded cord burns the ignition switch and harness.

# CLOCK

## REMOVAL AND INSTALLATION

### Removal steps

1. Instrument lower panel
2. Air outlet center panel assembly (Refer to P.54-31.)
3. Radio and tape player
4. Clock

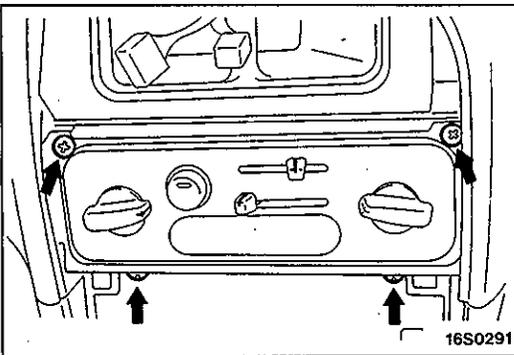


16S0284

## SERVICE POINTS OF REMOVAL

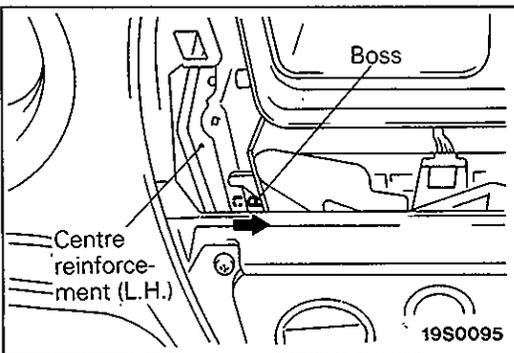
### 4. REMOVAL OF CLOCK

- (1) Remove the heater control assembly mounting screws:



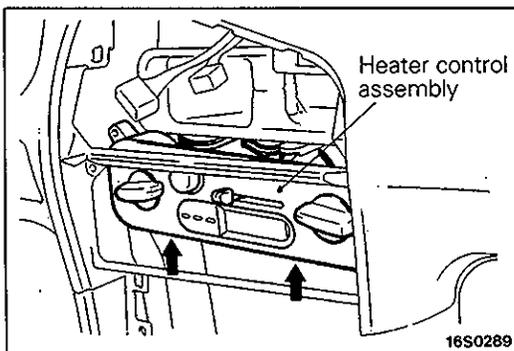
16S0291

- (2) Remove the heater control assembly boss from the center reinforcement (L.H.).



19S0095

- (3) Push the heater control assembly into the instrument panel, remove the clock mounting screws, and remove the clock.



16S0289

# RADIO AND TAPE PLAYER

## TROUBLESHOOTING

E54LC--

### QUICK-REFERENCE TROUBLESHOOTING CHART

Items	Problem symptom	Relevant chart
Noise	Noise appears at certain places when traveling (AM).	A-1
	Noise appears at certain places when traveling (FM).	A-2
	Mixed with noise, only at night (AM).	A-3
	Broadcasts can be heard but both AM and FM have a lot of noise	A-4
	There is more noise either on AM or on FM.	A-5
	There is noise when starting the engine.	A-6
	Some noise appears when there is vibration or shocks during traveling	A-7
	Noise sometimes appears on FM during traveling.	A-8
	Ever-present noise.	A-9
Radio	When switch is set to ON, no power is available.	B-1
	No sound from one speaker.	B-2
	There is noise but no reception for both AM and FM or no sound from AM, or no sound from FM.	B-3
	Insufficient sensitivity.	B-4
	Distortion on AM or on both AM and FM.	B-5
	Distortion on FM only.	B-6
	Too few automatic select stations.	B-7
	Insufficient memory (preset stations are erased).	B-8
Tape player	Cassette tape will not insert.	C-1
	No sound.	C-2
	No sound from one speaker.	C-3
	Sound quality is poor, or sound is weak.	C-4
	Cassette tape will not eject.	C-5
	Uneven revolution. Tape speed is fast or slow.	C-6
	Faulty auto reverse.	C-7
	Tape gets caught in mechanism.	C-8

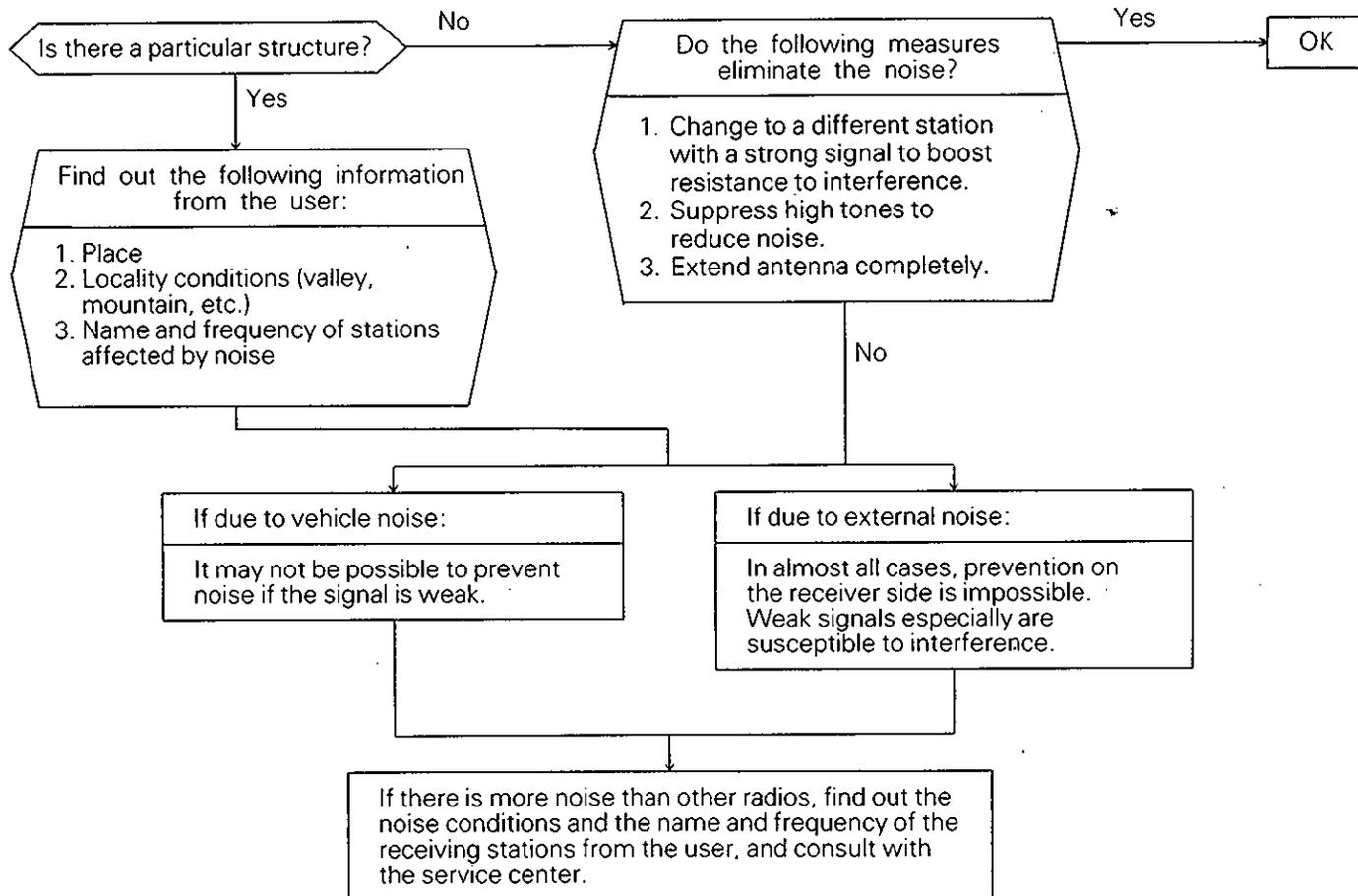
## NOTE

Refer to problem symptoms of AM radio for LW and MW radio.

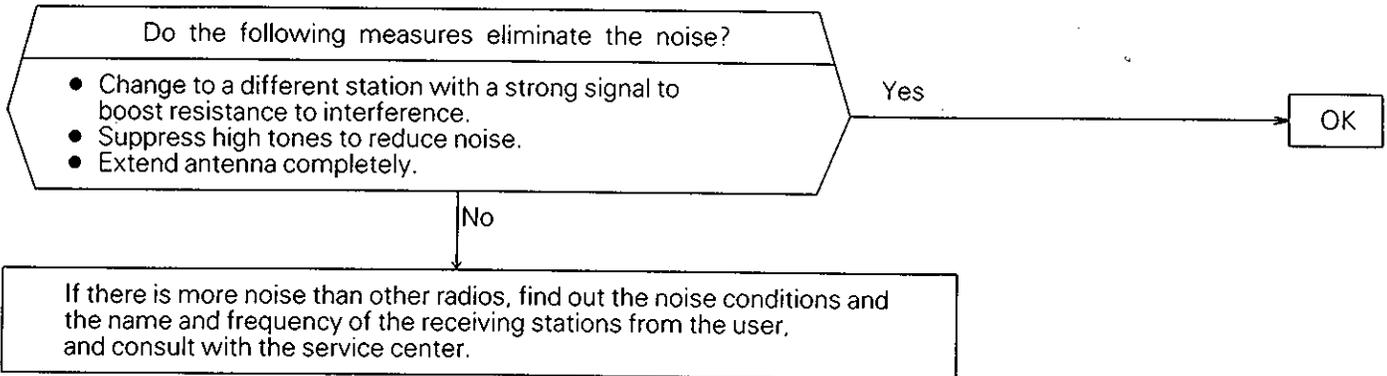
CHART

A. NOISE

**A-1 Noise appears at certain places when traveling (AM).**



**A-2 Noise appears at certain places when traveling (FM).**



**NOTE**

About FM waves:

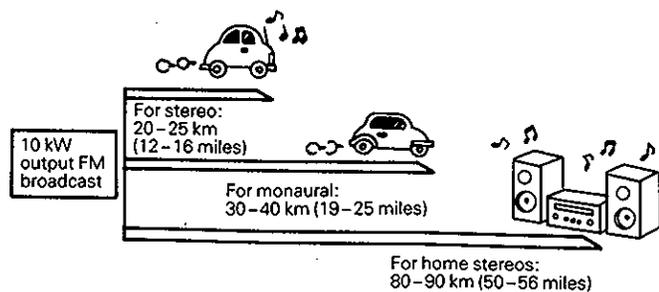
FM waves have the same properties as light, and can be deflected and blocked. Wave reception is not possible in the shadow of obstructions such as buildings or mountains.

1. The signal becomes weak as the distance from the station's transmission antenna increases. Although this may vary according to the signal strength of the transmitting station and intervening geographical formations or buildings, the area of good reception is approx. 20 – 25 km (12 – 16 miles) for stereo reception, and 30 – 40 km (19 – 25 miles) for monaural reception.
2. The signal becomes weak when an area of shadow from the transmitting antenna (places where there are obstructions such as mountains or buildings between the antenna and the car),

and noise will appear. <This is called first fading, and gives a steady buzzing noise.>

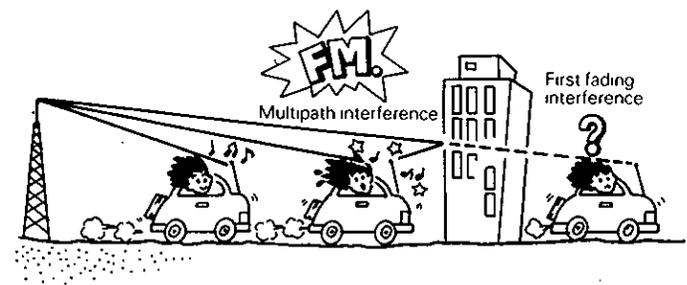
3. If a direct signal hits the antenna at the same time as a signal reflected by obstructions such as mountains or buildings, interference of the two signals will generate noise. During traveling, noise will appear each time the vehicle's antenna passes through this kind of obstructed area. The strength and interval of the noise varies according to the signal strength and the conditions of deflection. <This is called multipath noise, and is a repetitious buzzing.>
4. Since FM stereo transmission and reception has a weaker field than monaural, it is often accompanied by a hissing noise.

**FM Broadcast Good Reception Areas**



16A0663

**FM Signal Characteristics and Signal Interference**



16A0664

**A-3 Mixed with noise, only at night (AM).**

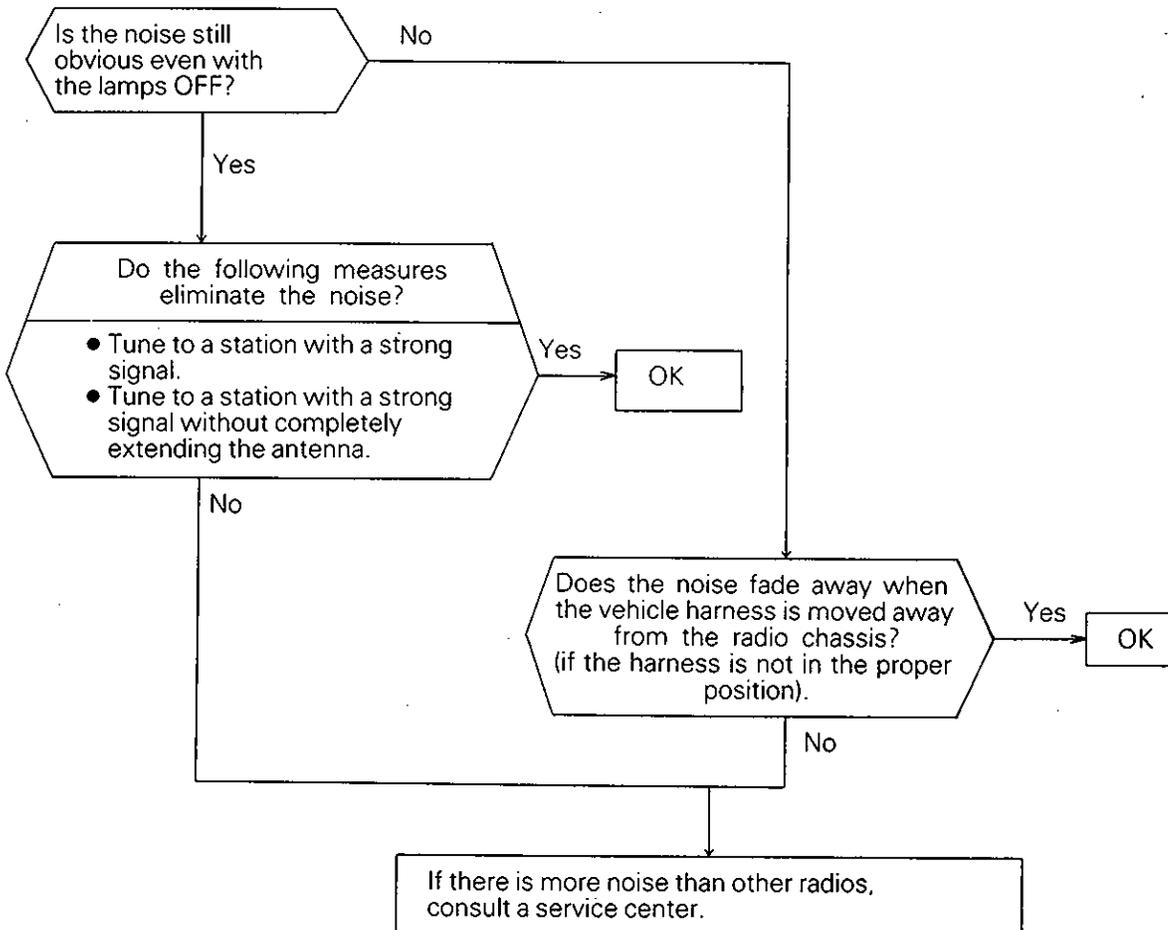
The following factors can be considered as possible causes of noise appearing at night.

1. Factors due to signal conditions: Due to the fact that long-distance signals are more easily received at night, even stations that are received without problem during the day may experience interference in a general worsening of reception conditions. The weaker a station is the more susceptible it is to interference, and a change to a different station or the appearance of a beating

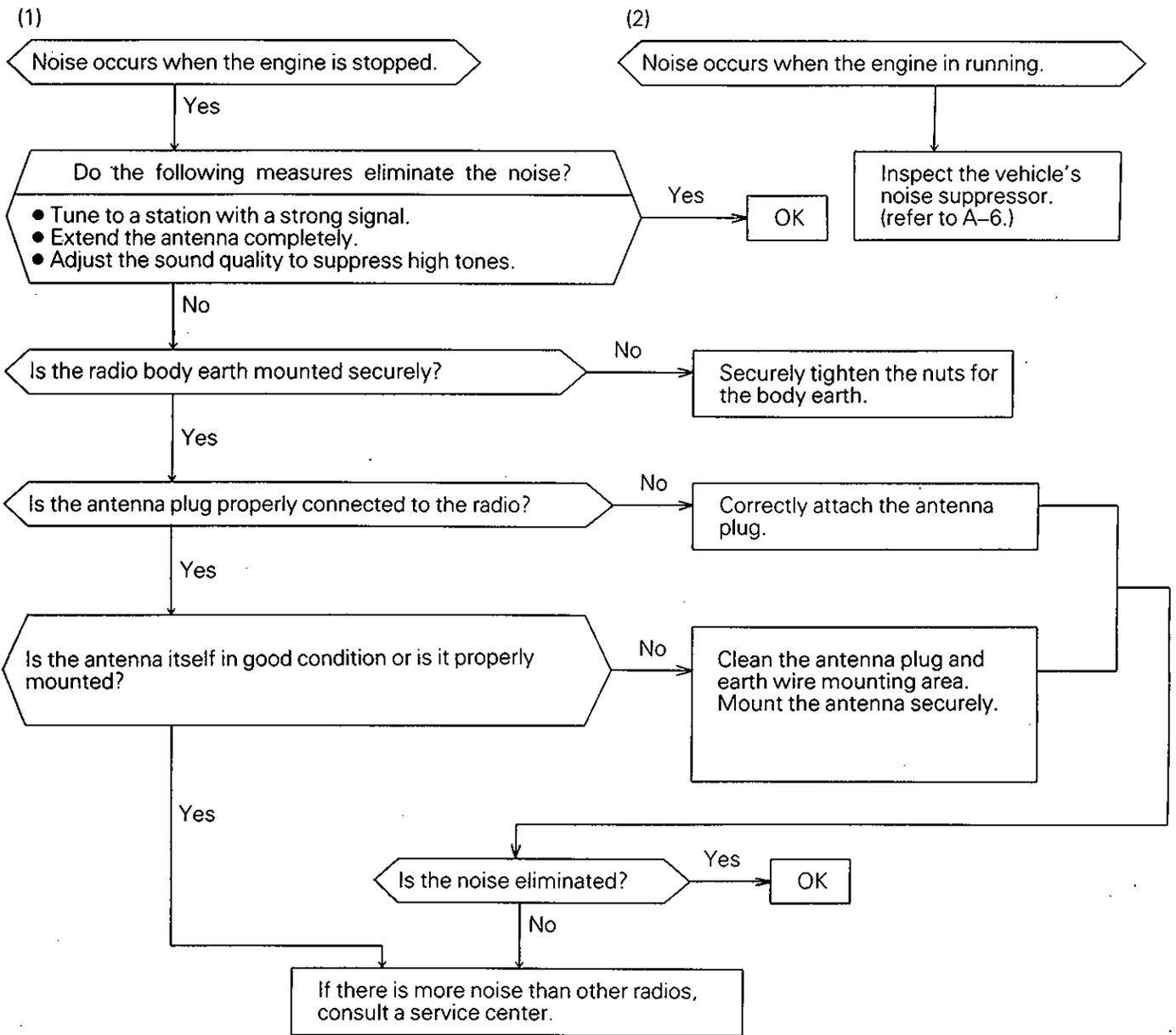
sound\* may occur.

Beat sound\*: Two signals close in frequency interfere with each other, creating a repetitious high-pitched sound. This sound is generated not only by sound signals but by electrical waves as well.

2. Factors due to vehicle noise: Alternator noise may be a cause.



**A-4 Broadcasts can be heard but both AM and FM have a lot of noise.**



**NOTE**

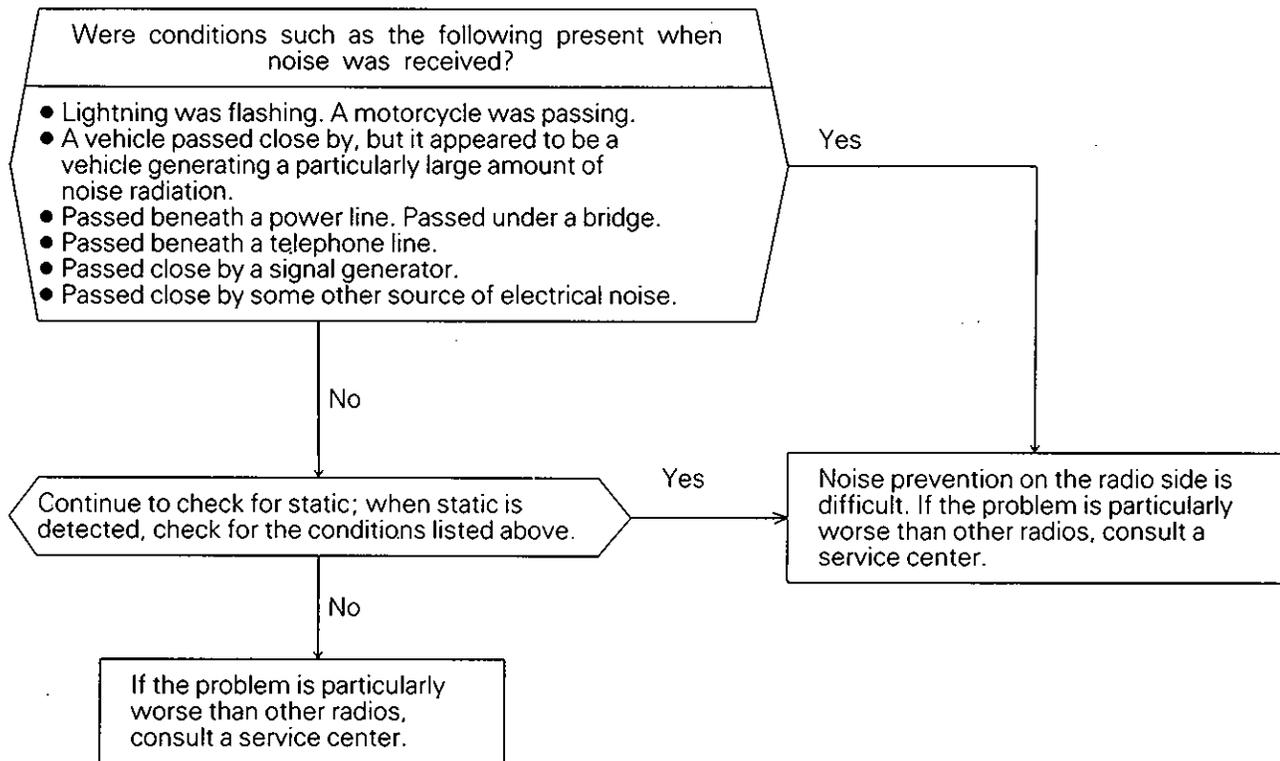
About noise encountered during FM reception only. Due to differences in FM and AM systems, FM is not as susceptible as AM to interference from engines, power lines, lightning, etc. On the other hand, there are cases due to the characteristics of FM waves of noise or distortion generated by typical

noise interference (first fading and multipath). (Refer to A-2.)

<Noise (hissing) occurs in weak signal areas such as mountainous regions, but this is not due to a problem with the radio.>

**A-5 There is more noise either on AM or on FM.**

1. There is much noise only on AM  
Due to differences in AM and FM systems, AM is more susceptible to noise interference.



2. There is much noise only on FM  
Due to differences in FM and AM systems, FM is not as susceptible as AM to interference from engines, power lines, lightning, etc. On the other hand, there are cases due to the characteristics of FM waves of noise or distortion

generated by typical noise interference (first fading and multipath). (Refer to A-2) <Noise (hissing) occurs in weak signal areas such as mountainous regions, but this is not due to a problem with the radio.>

<b>A-6</b>	<b>There is noise when starting the engine.</b>
------------	---

Noise type Sounds are in parentheses ( ).	Conditions	Cause	Inspection or replacement	
			Noise-preventive part	Mounting place (next page)
AM, FM: Ignition noise (Popping, Snapping, Cracking, Buzzing)	<ul style="list-style-type: none"> <li>Increasing the engine speed causing the popping sound to speed up, and volume decreases.</li> <li>Disappears when the ignition switch is turned to ACC.</li> </ul>	<ul style="list-style-type: none"> <li>Mainly due to the spark plugs.</li> <li>Due to the engine noise.</li> </ul>	<ul style="list-style-type: none"> <li>Earth cable</li> <li>Noise capacitor</li> </ul>	1, 2  3
Other electrical components	–	Noise may appear as electrical components become older.	Repair or replace electrical components.	
Static electricity (Cracking, Crinkling)	<ul style="list-style-type: none"> <li>Disappears when the vehicle is completely stopped.</li> <li>Severe when the clutch is engaged.</li> </ul>	Occurs when parts or wiring move for some reason and contact metal parts of the body.	Return parts or wiring to their proper position.	
	<ul style="list-style-type: none"> <li>Various noises are produced depending on the body part of the vehicle.</li> </ul>	Due to detachment from the body of the front hood, bumpers, exhaust pipe and muffler, suspension, etc.	Earth parts by bonding. Cases where the problem is not eliminated by a single response to one area are common, due to several body parts being imperfectly earthed.	

**Caution**

- Connecting a high tension cable to the noise filter may destroy the noise filter and should never be done.**
- Check that there is no external noise. Since failure due this may result in misdiagnosis due to inability to identify the noise source, this operation must be performed.**
- Noise prevention should be performed by suppressing strong sources of noise step by step.**

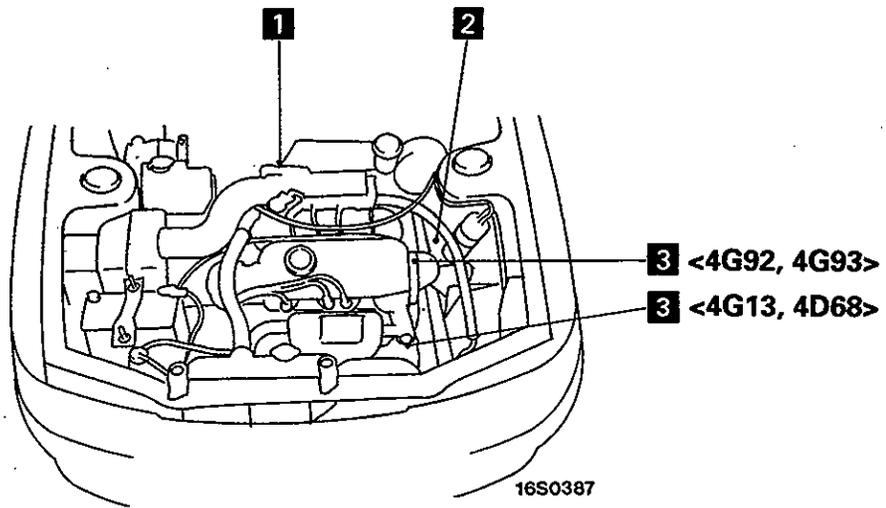
**NOTE**

- Capacitor  
The capacitor does not pass D.C. current, but as the number of waves increases when it passes A.C. current, impedance (resistance against

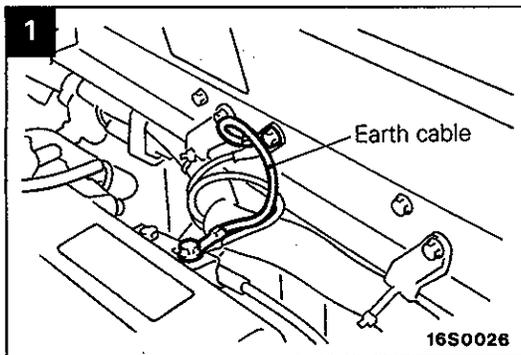
A.C.) decreases, and current flow is facilitated. A noise suppressing condenser which takes advantage of this property is inserted between the power line for the noise source and the earth. This suppresses noise by earthing the noise component (A.C. or pulse signal) to the body of the vehicle.

- Coil  
The coil passes D.C. current, but impedance rises as the number of waves increases relative to the A.C. current. A noise suppressing coil which takes advantage of this property is inserted into the power line for the noise source, and works by preventing the noise component from flowing or radiating out of the line.

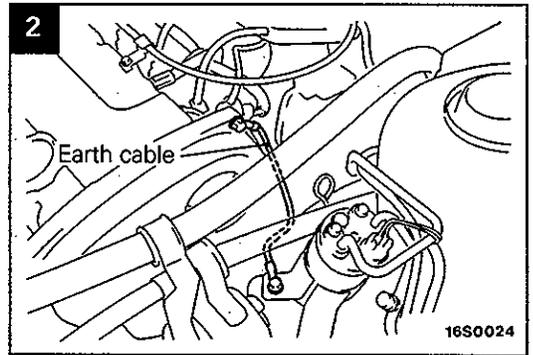
**NOISE SUPPRESSOR MOUNTING LOCATION**



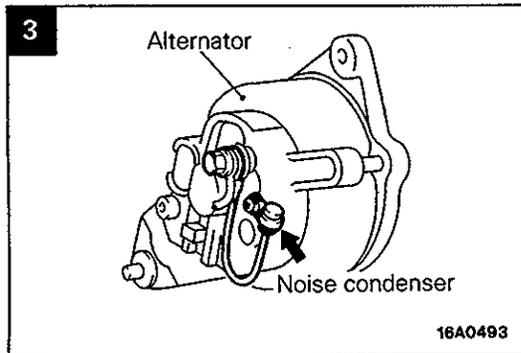
**<Petrol-powered vehicles>**



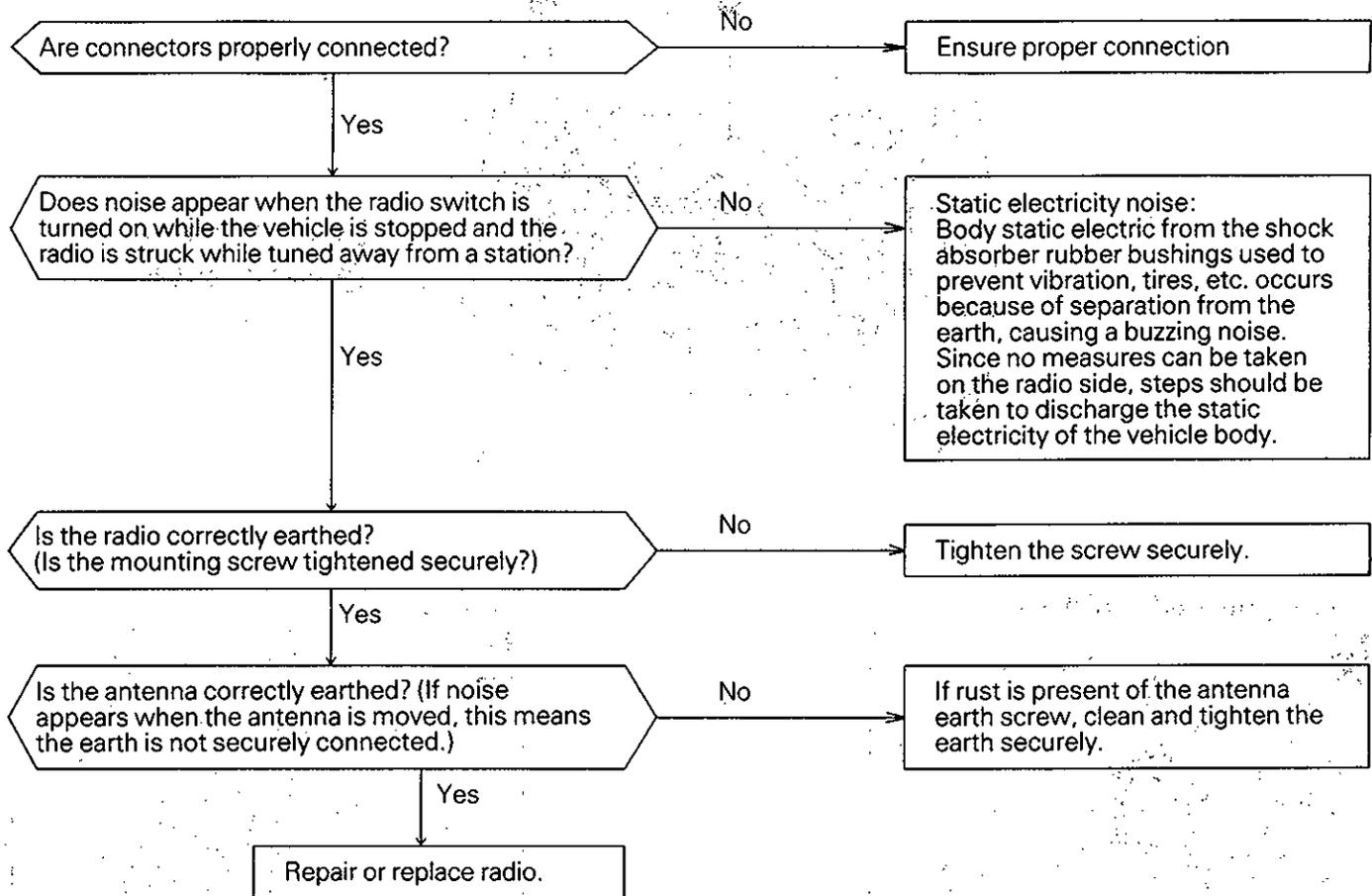
**<4G93>**



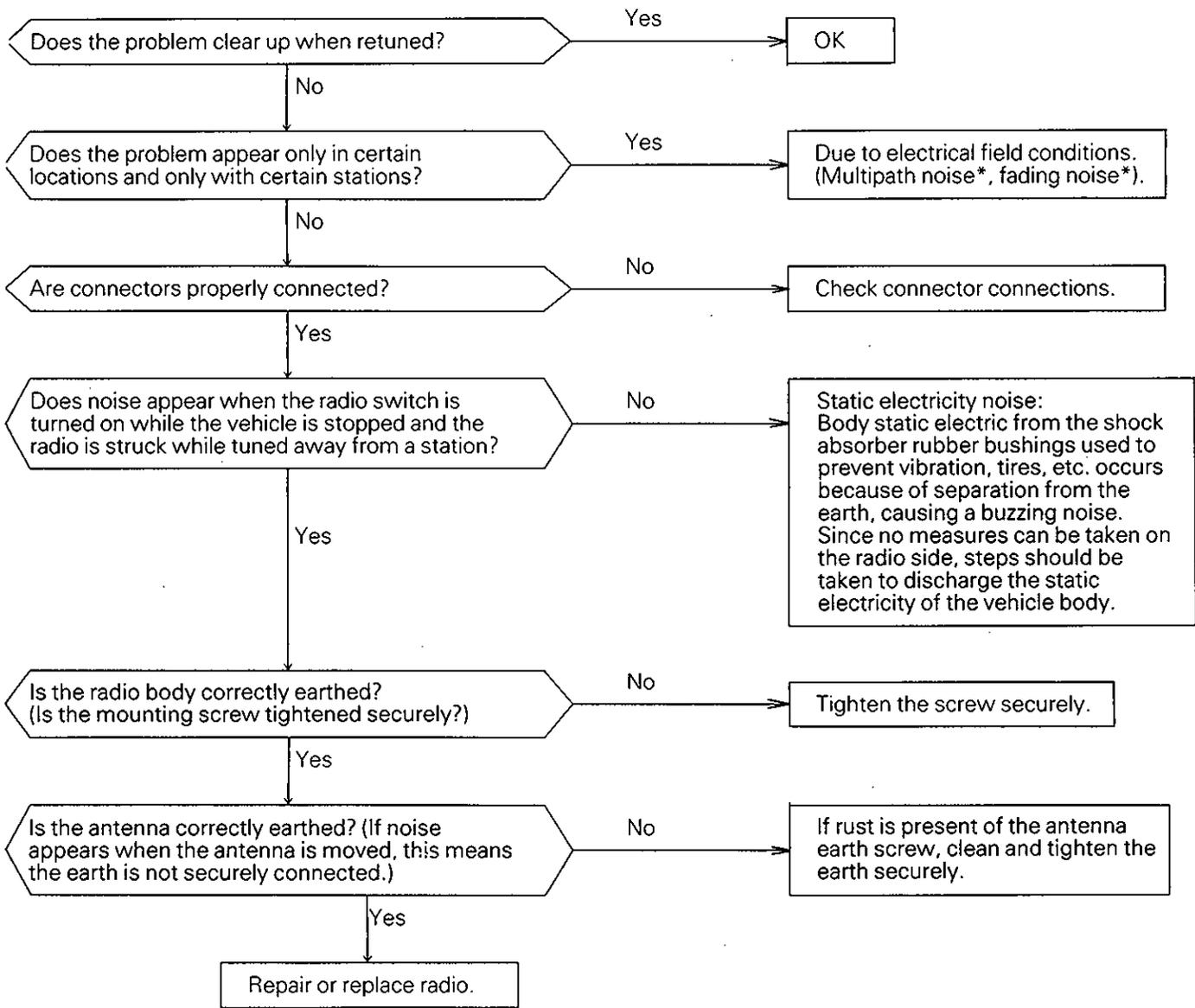
**Vehicles with LW/MW/FM radio**



**A-7 Some noise appears when there is vibration or shocks during traveling.**



**A-8 Noise sometimes appears on FM during traveling.**



\* About multipath noise and fading noise  
 Because the frequency of FM waves is extremely high, it is highly susceptible to effects from geological formations and buildings. These effects disrupt the broadcast signal and obstruct reception in several ways.

- Multipath noise  
 This describes the echo that occurs when the broadcast signal is reflected by a large

obstruction and enters the receiver with a slight time delay relative to the direct signal (repetitious buzzing).

- Fading noise  
 This is a buzzing noise that occurs when the broadcast beam is disrupted by obstructing objects and the signal strength fluctuates intricately within a narrow range.

**A-9 Ever-present noise.**

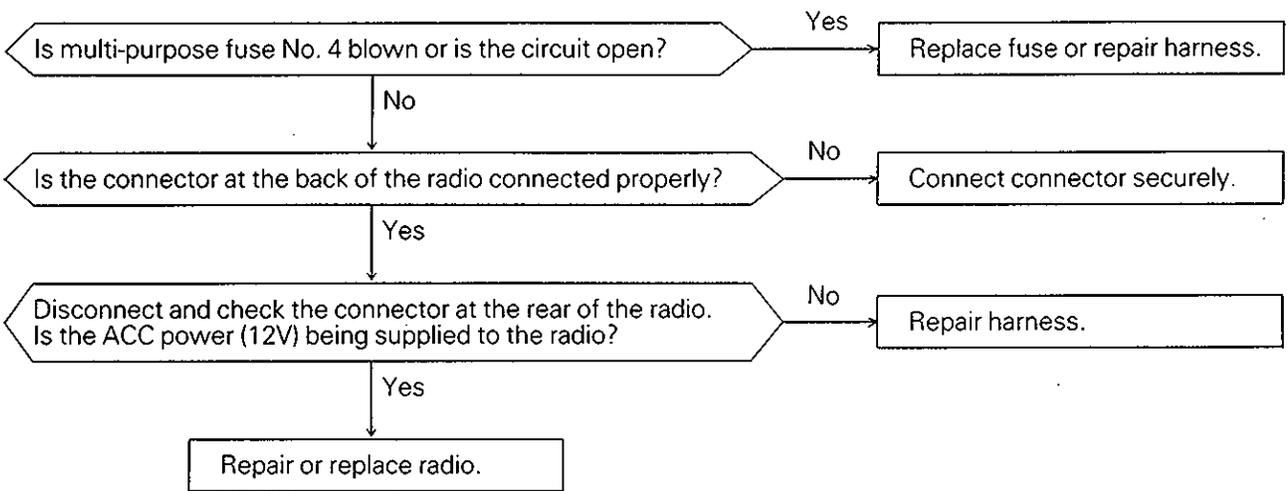
Noise is often created by the following factors, and often the radio is OK when it is checked individually.

- Traveling conditions of the vehicle
- Terrain of area traveled through
- Surrounding buildings
- Signal conditions
- Time period

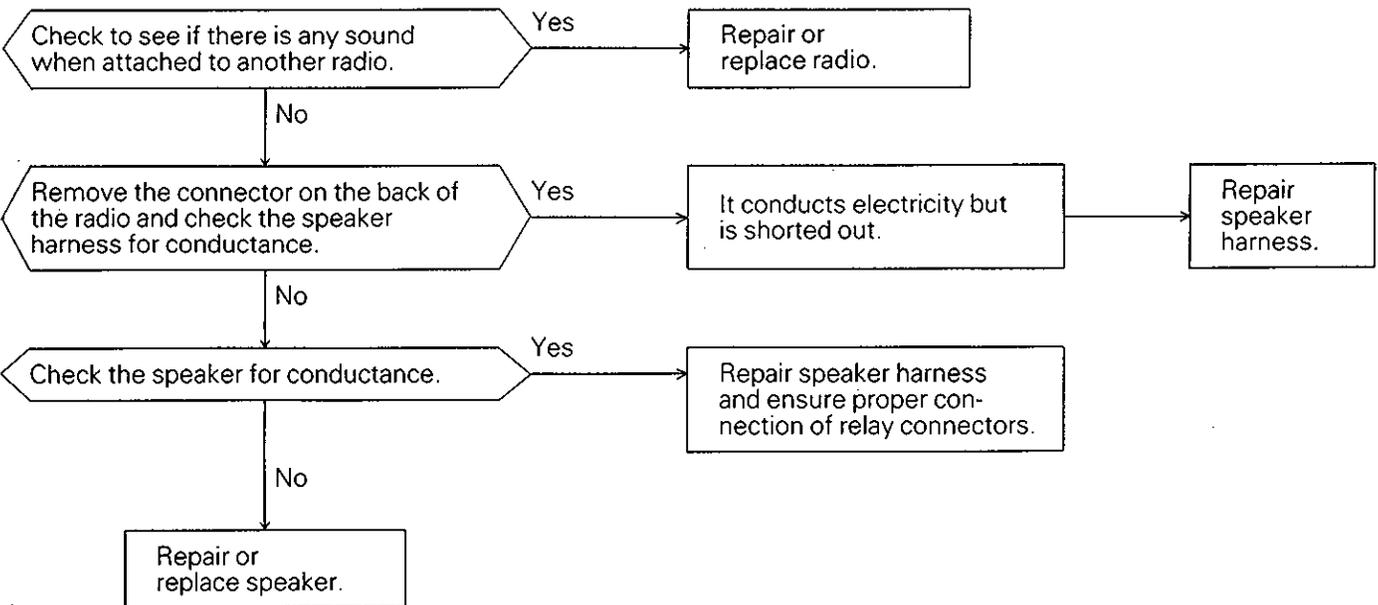
For this reason, if there are still problems with noise even after the measures described in steps A-1 to A-8 have been taken, get information on the factors listed above as well as determining whether the problem occurs with AM or FM, the station names, frequencies, etc., and contact a service center.

**B. RADIO**

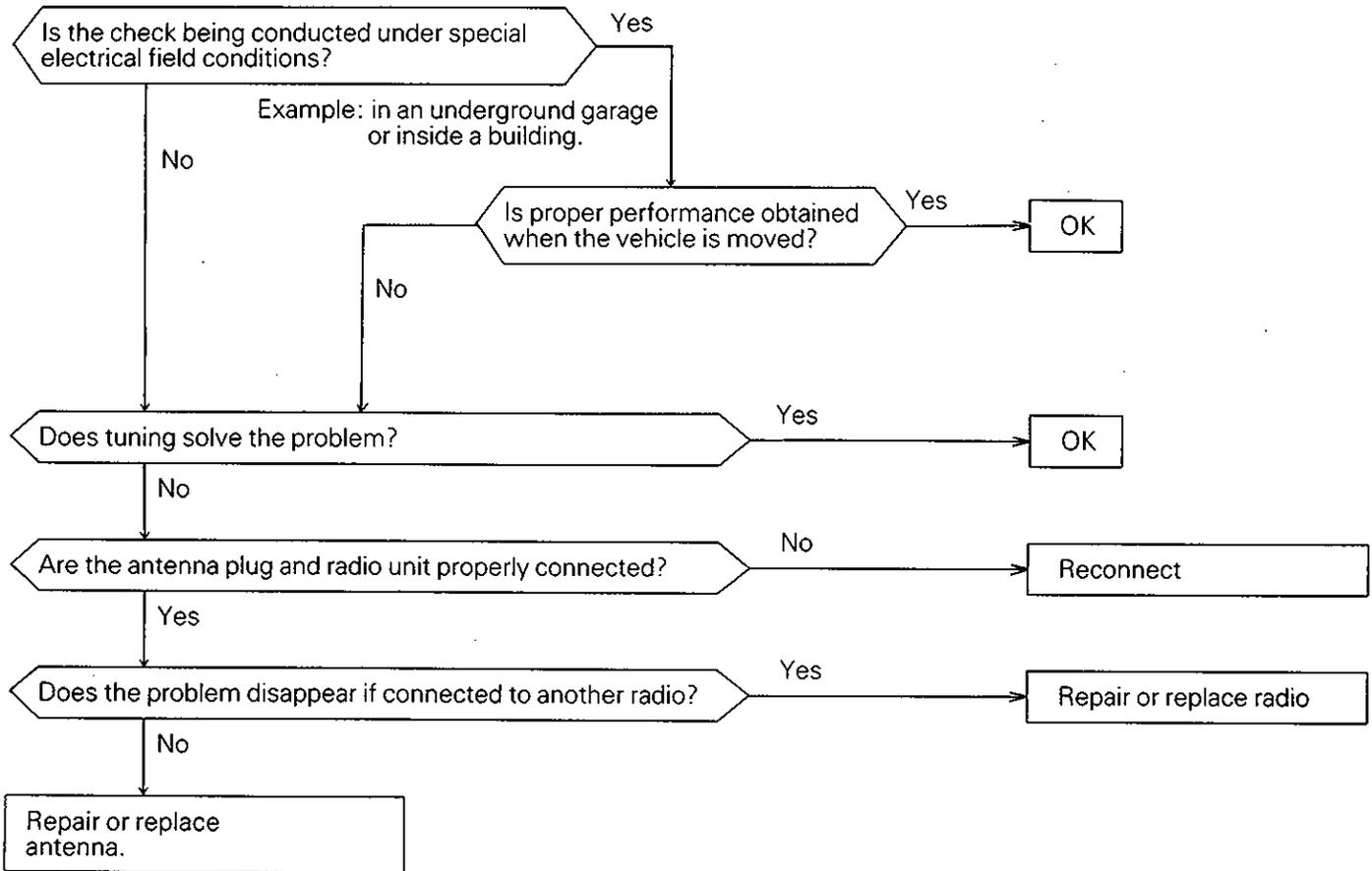
**B-1 No power is supplied when the switch is set to ON.**



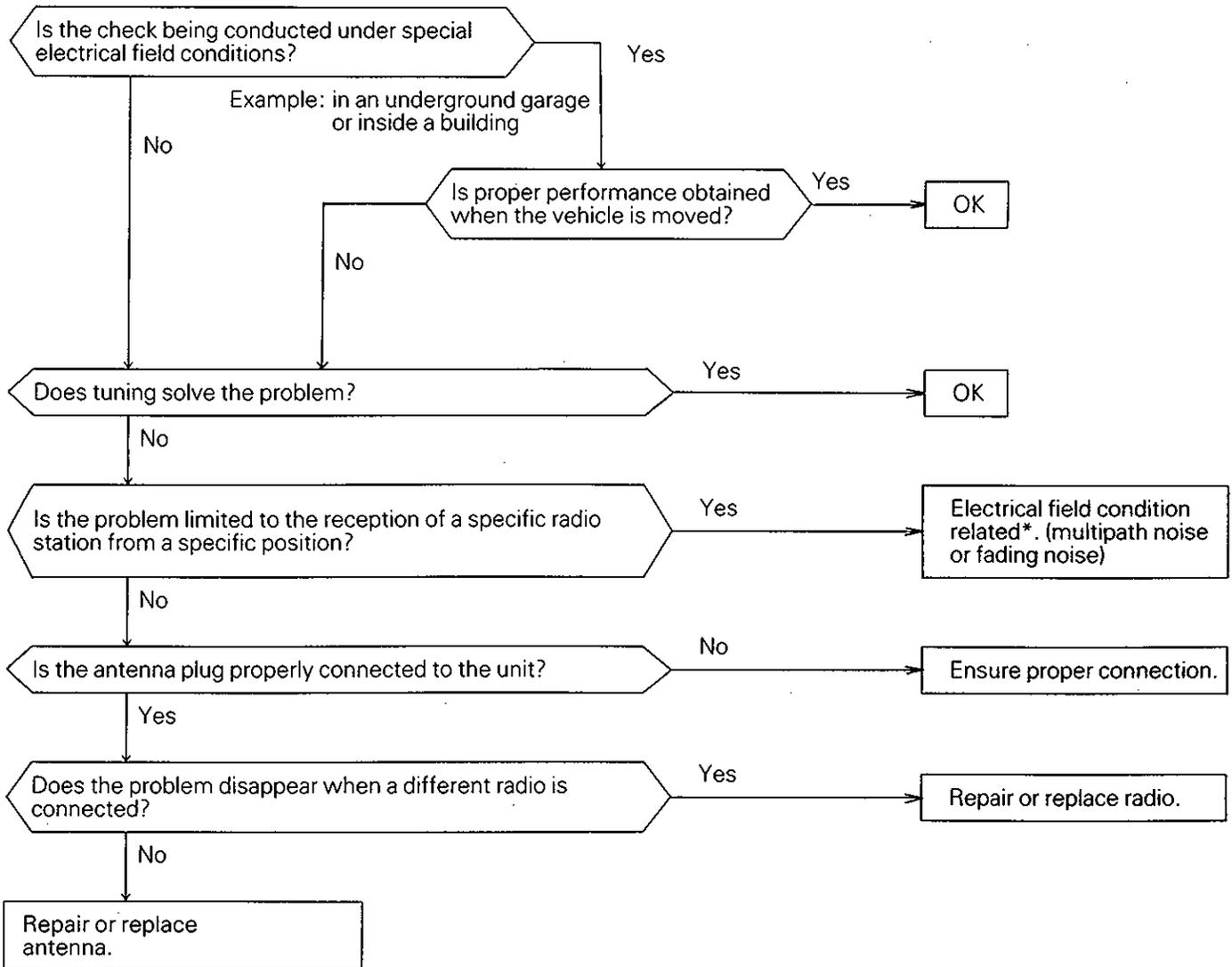
**B-2 No sound from one speaker.**



**B-3** There is noise but no reception for both AM and FM or no sound from AM, or no sound from FM.

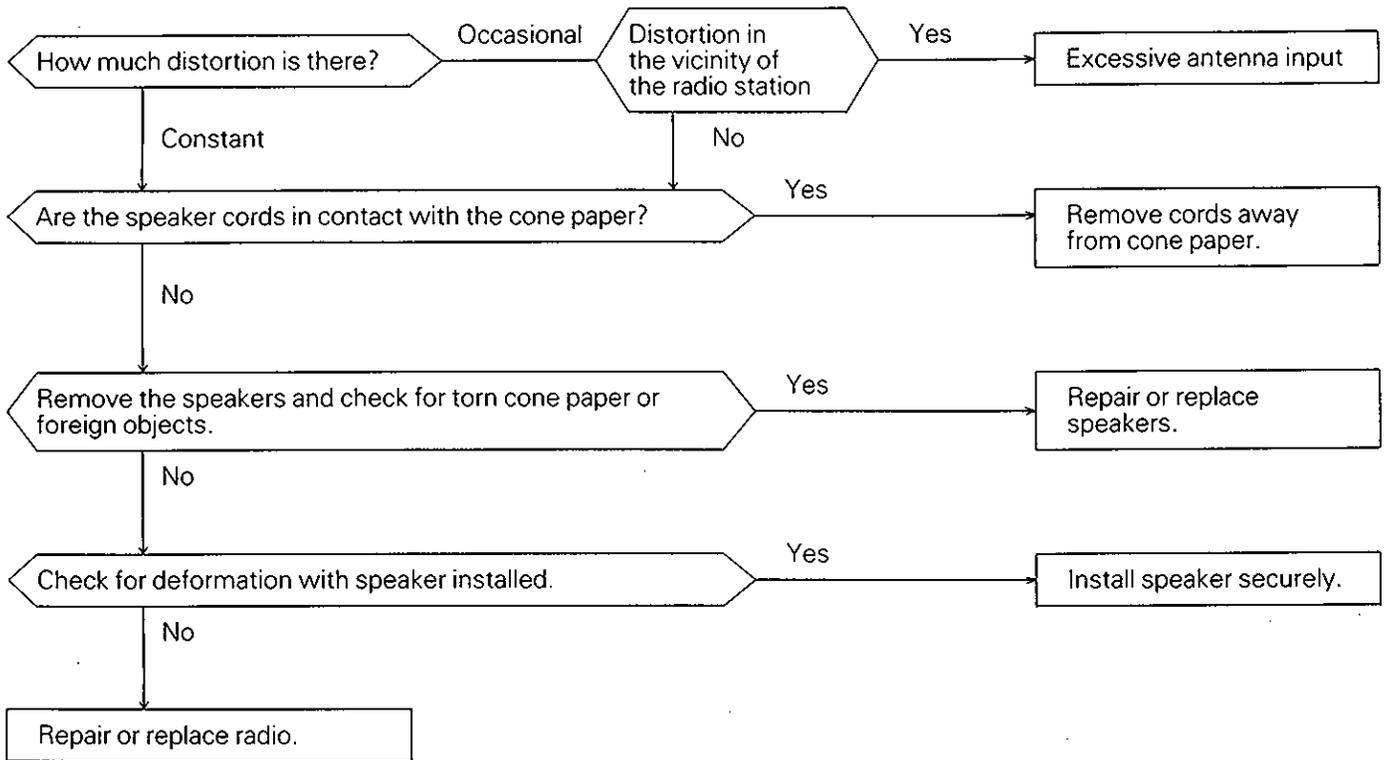


**B-4 Insufficient sensitivity.**

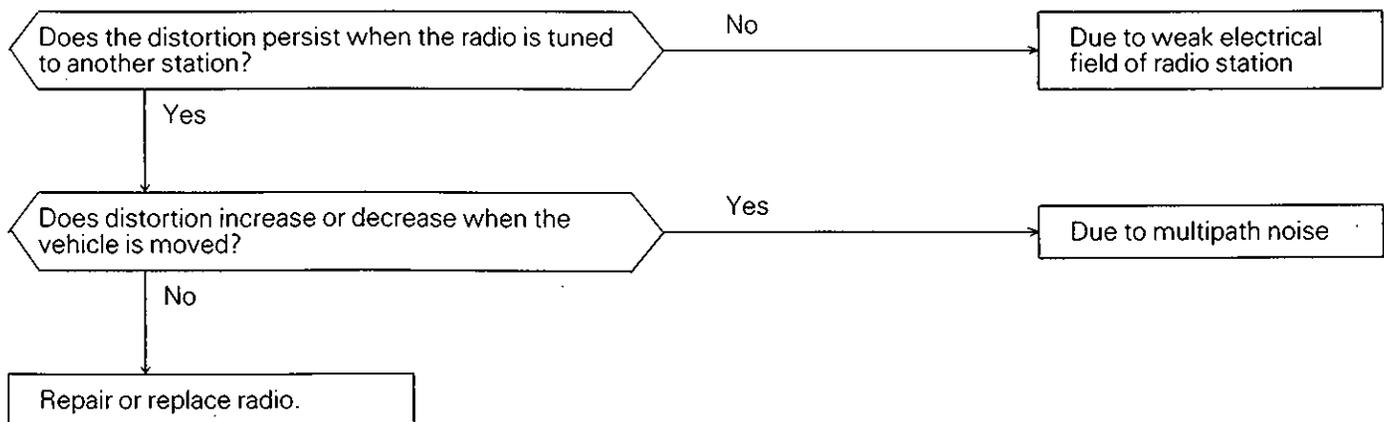


\* For multipath noise and fading noise problems, refer to P. 54-49.

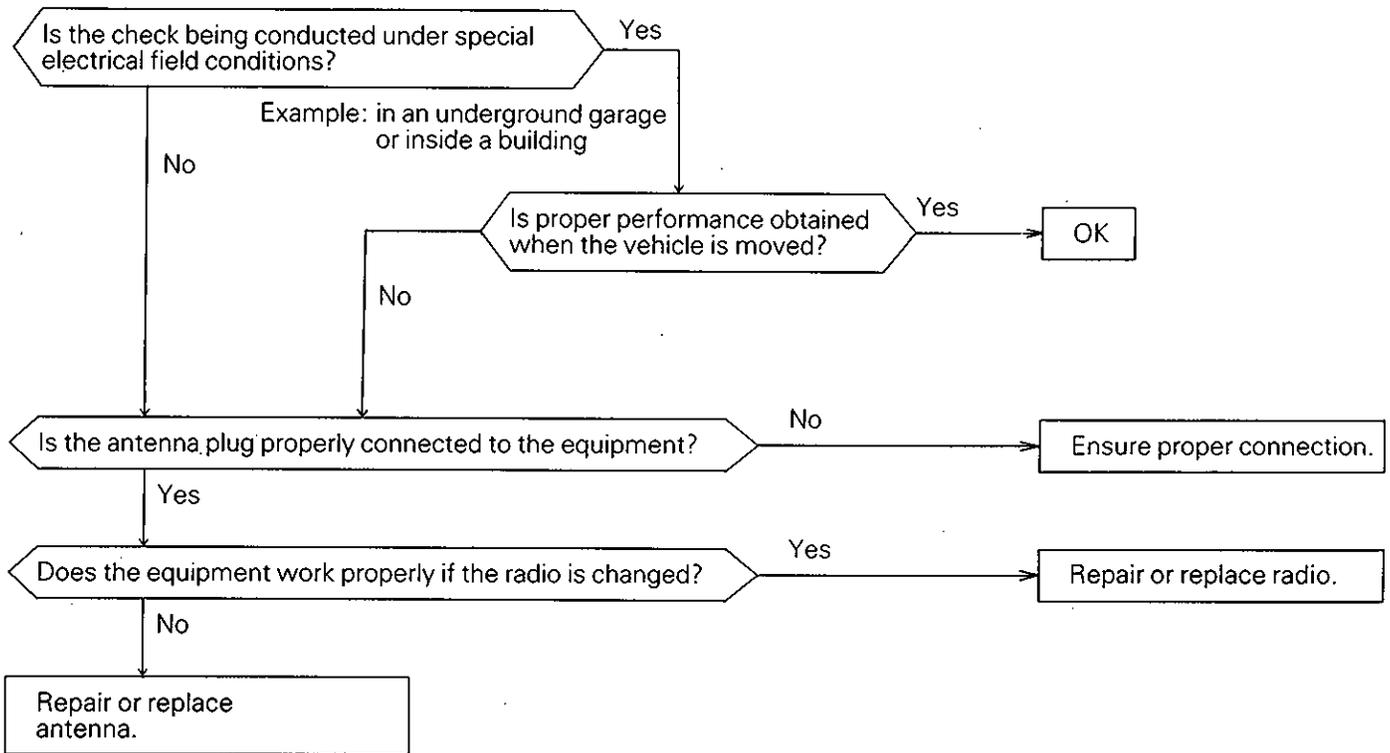
**B-5 Distortion on AM or on both AM and FM.**



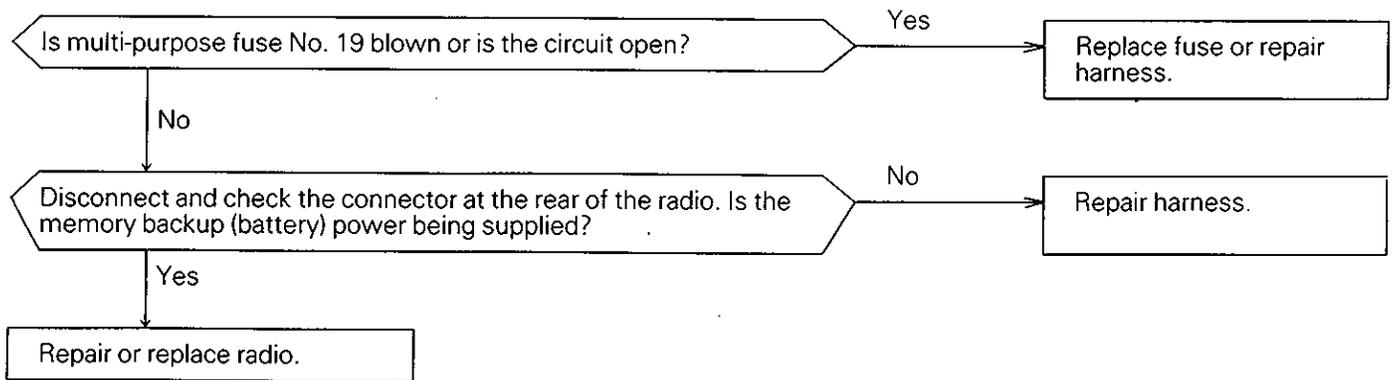
**B-6 Distortion on FM only**



**B-7 Too few automatic select stations.**

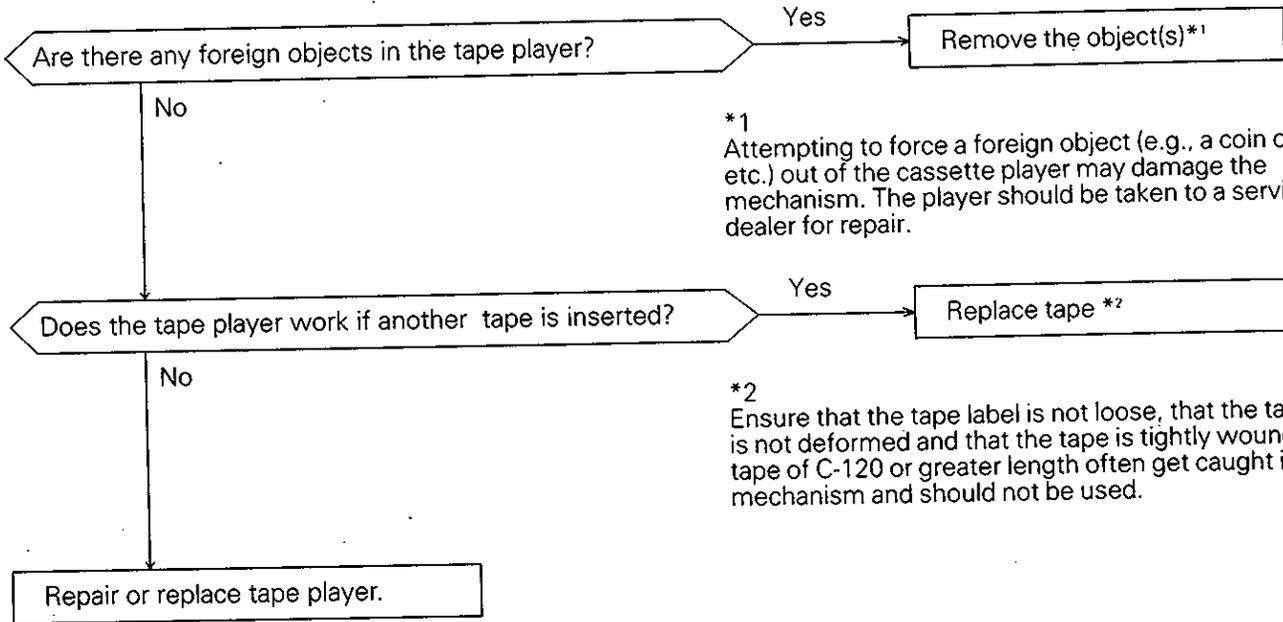


**B-8 Insufficient memory (preset stations are erased).**

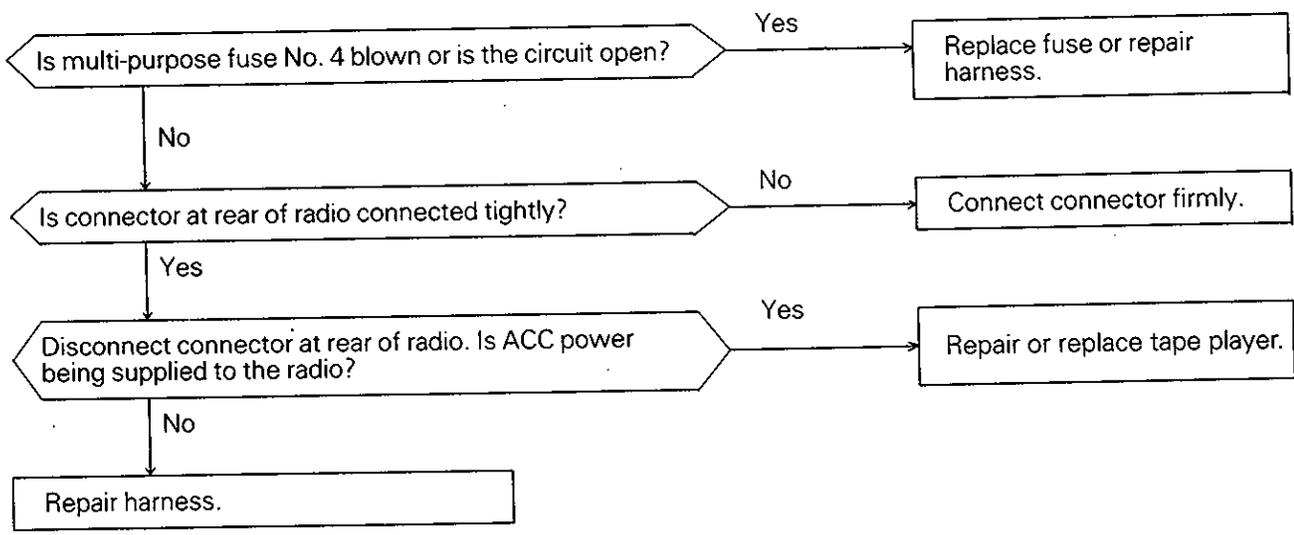


C. TAPE PLAYER

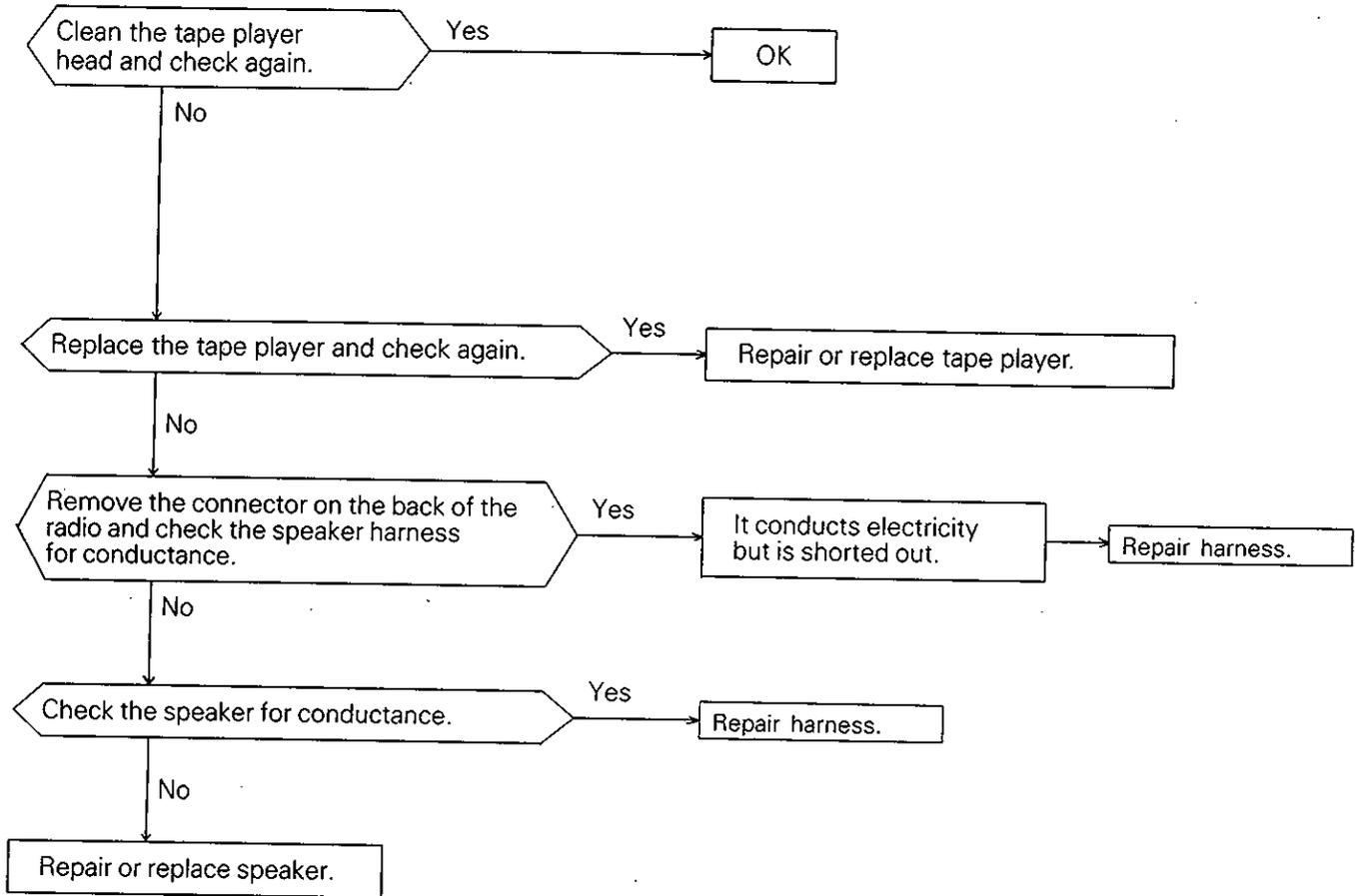
**C-1** Cassette tape will not be inserted.



**C-2** No sound (even after a tape has been inserted).

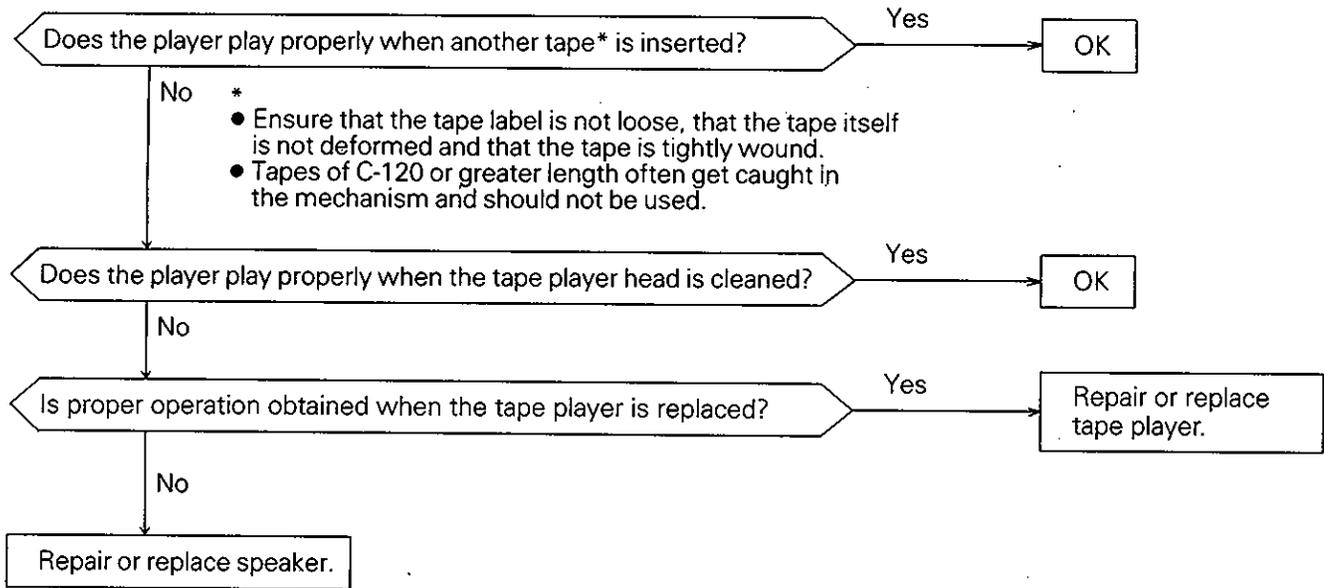


**C-3 No sound from one speaker.**



- Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound.
- Tapes of C-120 or greater length often get caught in the mechanism and should not be used.

**C-4 Sound quality is poor, or sound is weak.**

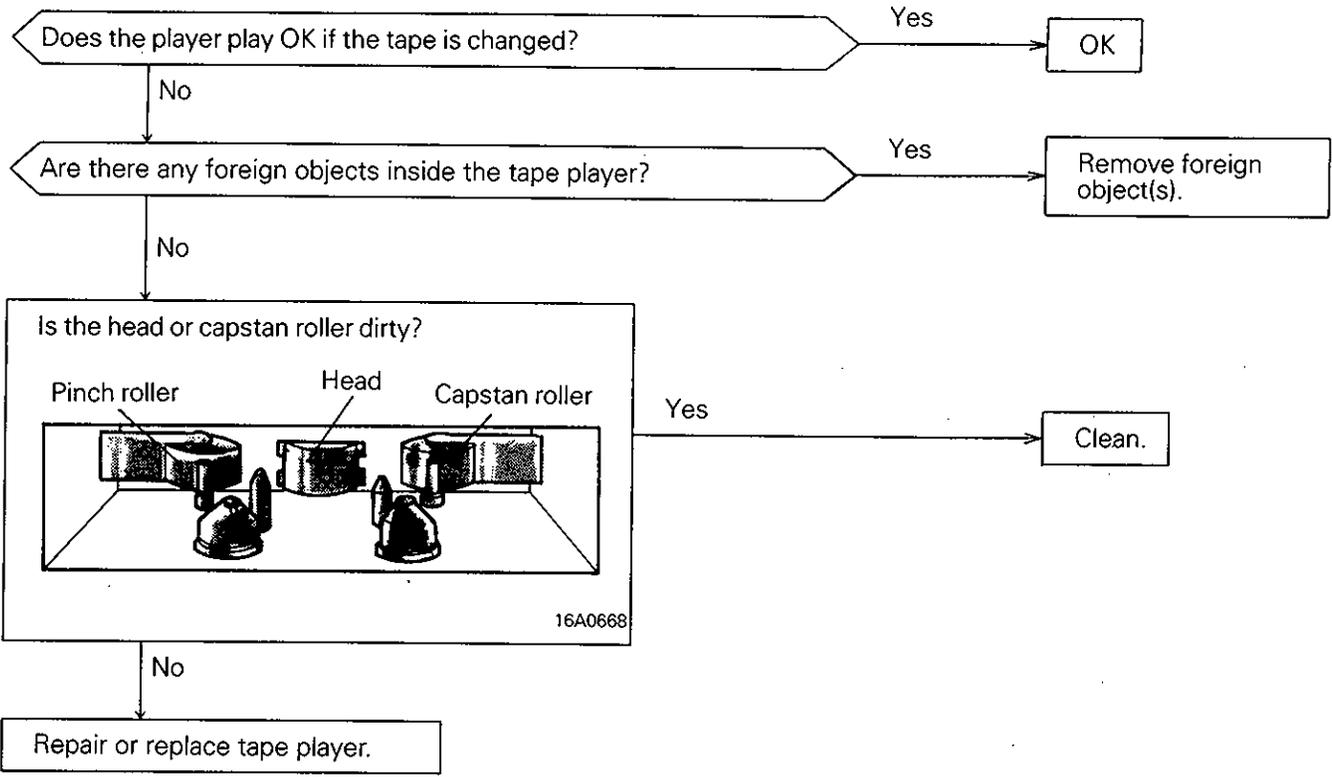


**C-5 Cassette tape will not eject.**

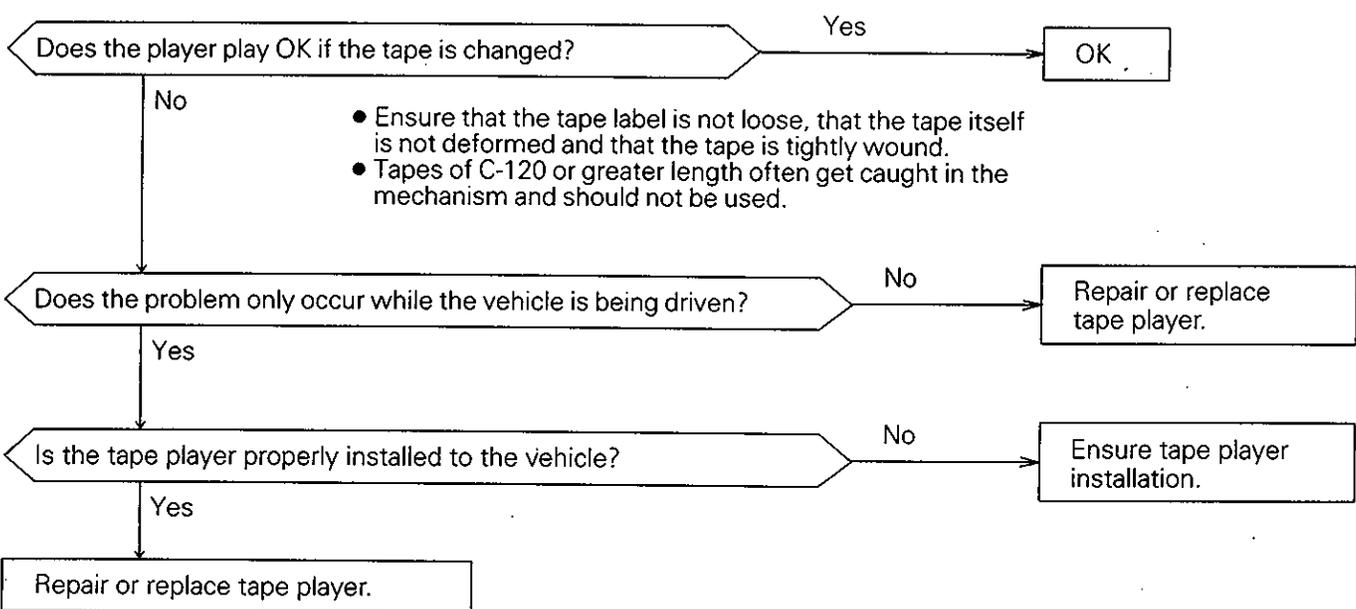
The problems covered here are all the result of the use of a bad tape (deformed or not properly tightened) or of a malfunction of the tape player itself. Malfunctions involving the tape becoming caught in

the mechanism and ruining the case are also possible, and attempting to force the tape out of the player can cause damage to the mechanism. The player should be taken to a service dealer for repair.

**C-6 Uneven revolution. Tape speed is fast or slow.**

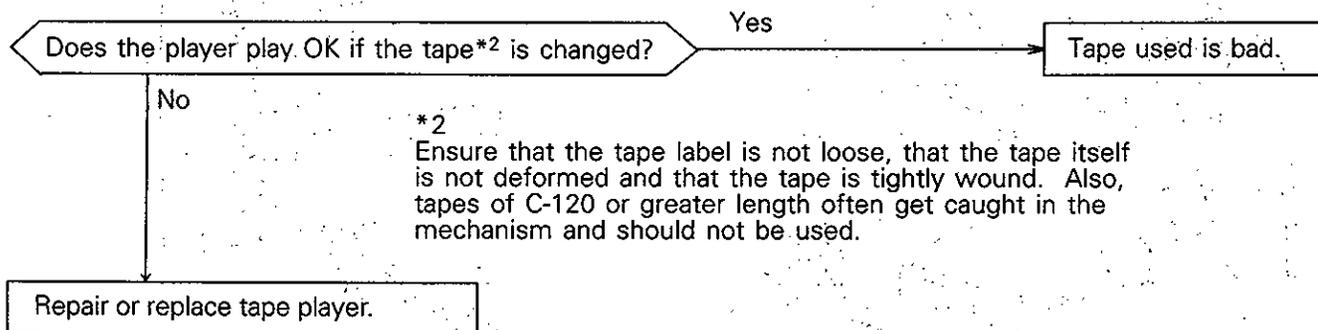


**C-7 Faulty auto reverse.**



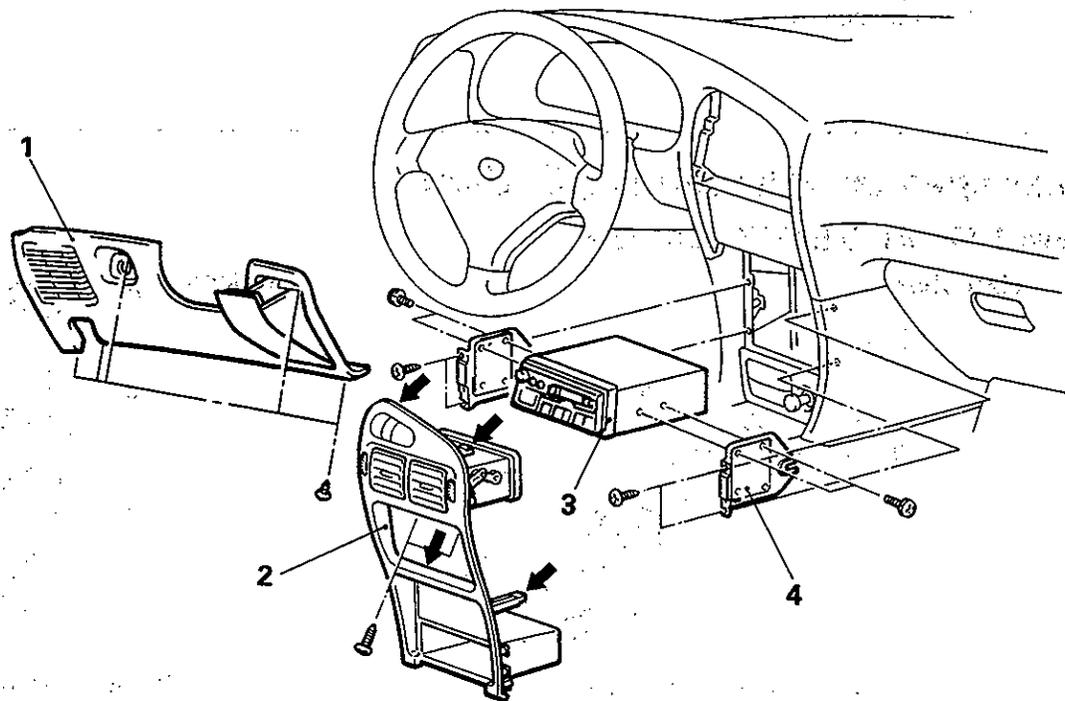
## C-8 Tape gets caught in mechanism\*1.

\*1  
When the tape is caught in the mechanism, the case may not eject. When this occurs, do not try to force the tape out as this may damage the tape player mechanism. Take the cassette to a service dealer for repair.



## RADIO AND TAPE PLAYER REMOVAL AND INSTALLATION

E54LHAQ



### Removal steps

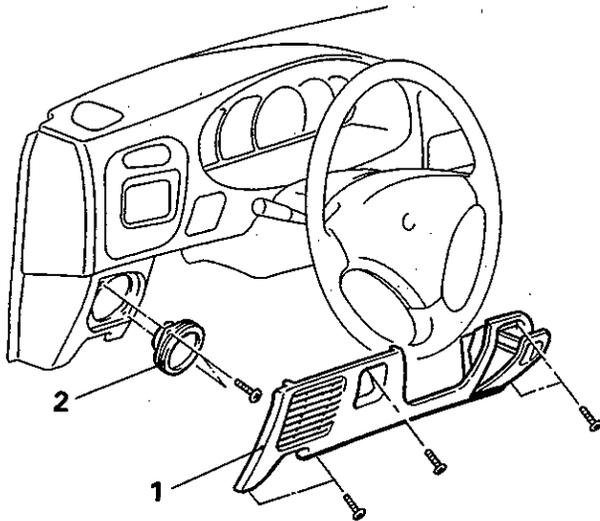
1. Instrument lower panel
2. Air outlet center panel assembly (Refer to P.54-31.)
3. Radio and tape player
4. Bracket

16S0285

**SPEAKER**

**Front speaker**

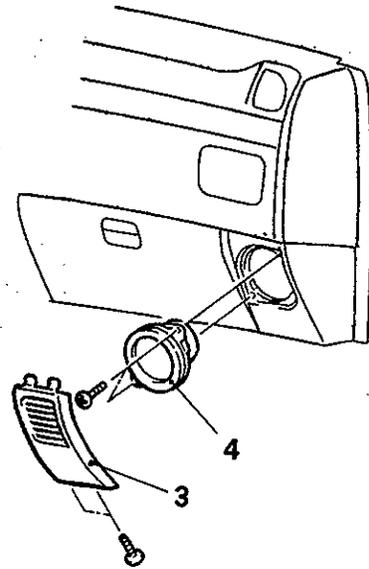
**REMOVAL AND INSTALLATION**



16S0319

**Front speaker (driver's side) removal steps**

- 1. Instrument lower panel
- 2. Front speaker



16S0290

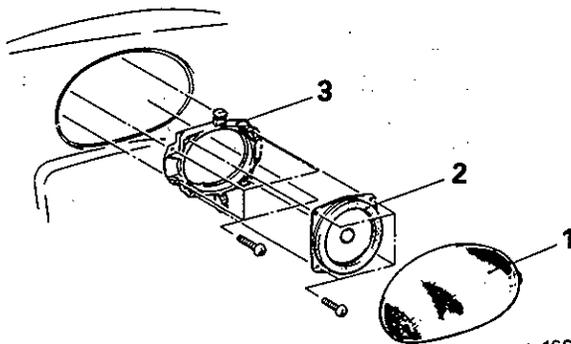
**Front speaker (passenger's side)**

- 3. Corner panel
- 4. Front speaker

**Rear speaker <Hatchback, Sedan>**

**REMOVAL AND INSTALLATION**

**<Hatchback>**



16S0328

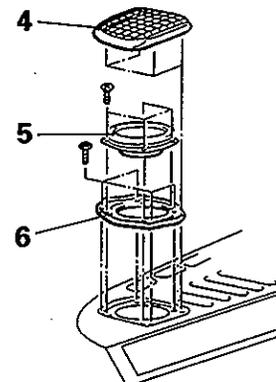
**Removal steps <Hatchback>**

- ◆◆ 1. Speaker garnish
- ◆◆ 2. Rear speaker
- ◆◆ 3. Speaker cover

**NOTE**

Remove the speaker at the L.H. side by the same procedure.

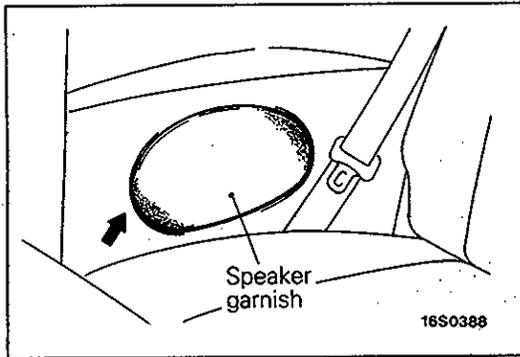
**<Sedan>**



16S0052

**Removal steps <Sedan>**

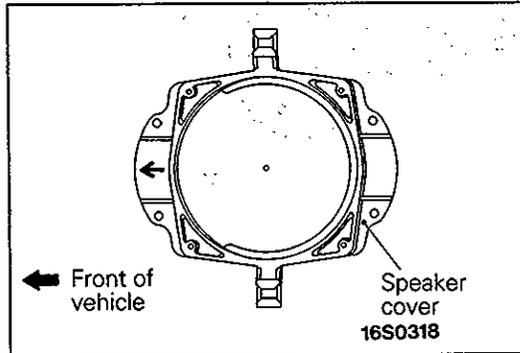
- ◆◆ 4. Speaker garnish
- ◆◆ 5. Rear speaker
- ◆◆ 6. Speaker bracket



**SERVICE POINTS OF REMOVAL**

**1. REMOVAL OF SPEAKER GARNISH**

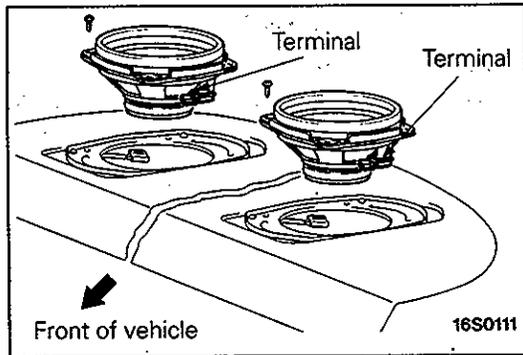
Remove the front of the speaker garnish first.



**SERVICE OF POINT OF INSTALLATION**

**3. INSTALLATION OF SPEAKER COVER**

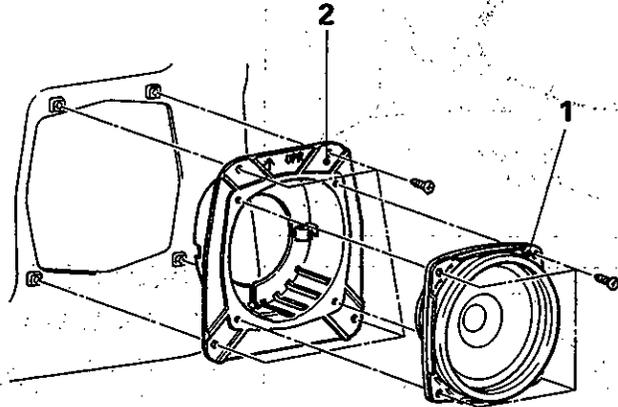
Install the speaker cover so that the arrow is facing the front of the vehicle.



**5. INSTALLATION OF SPEAKER**

Install both the left and right speakers so that the terminals are to the left when facing towards the front of the vehicle.

**Door Speaker <Wagon>  
REMOVAL AND INSTALLATION**



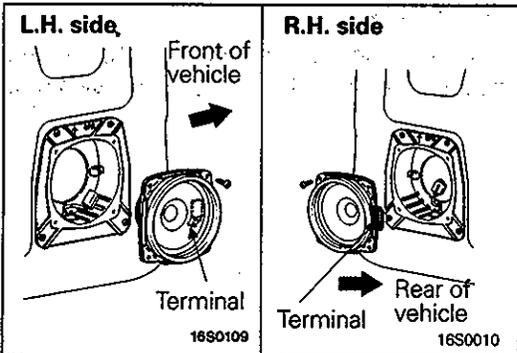
16S0108

**Removal steps**

- Door trim (Refer to GROUP 42 – Door Trim and Water-proof Film)
- ◆◆ 1. Door speaker
- 2. Speaker cover

**NOTE**

Remove the speaker at the L.H. side by the same procedure.

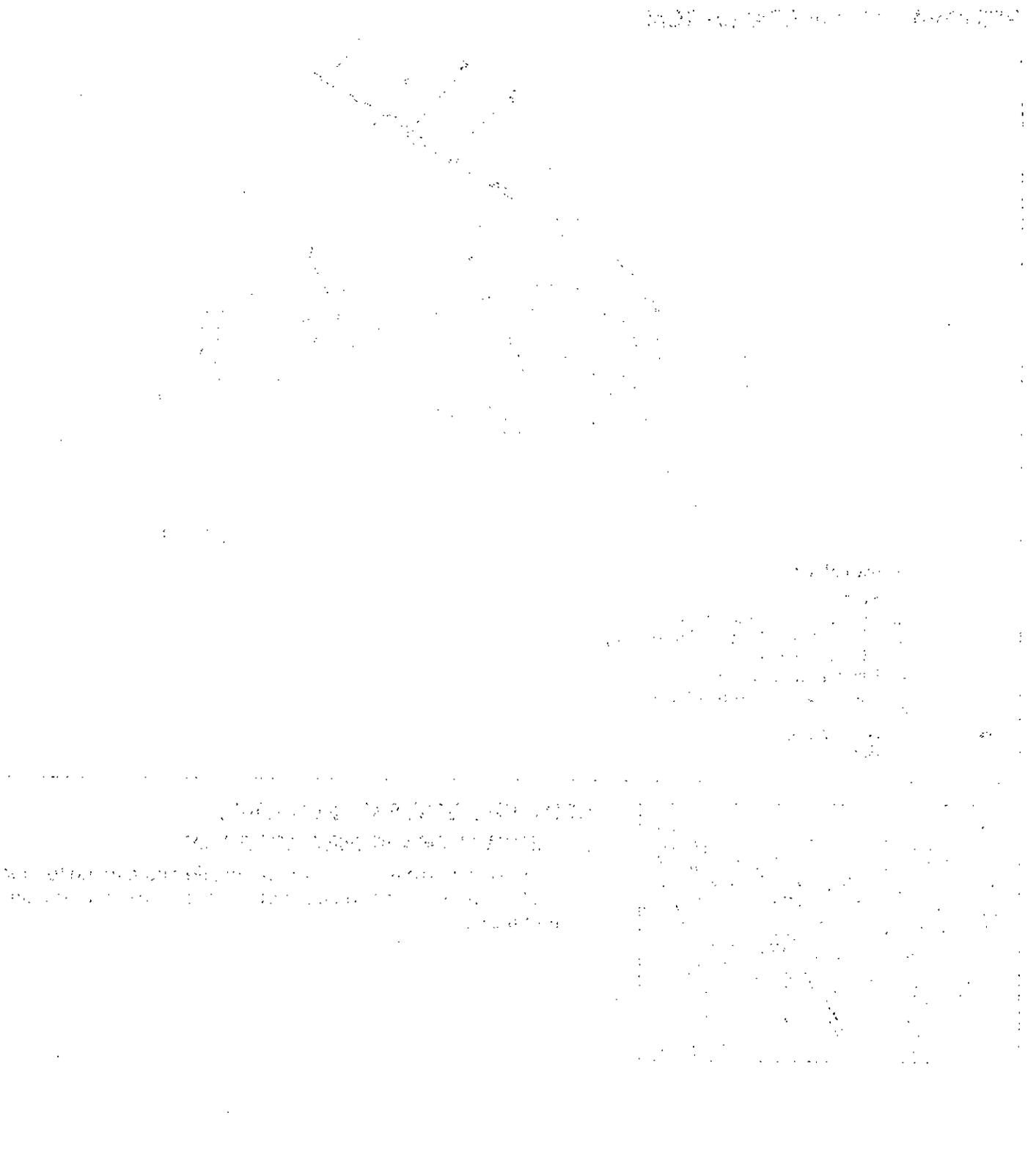


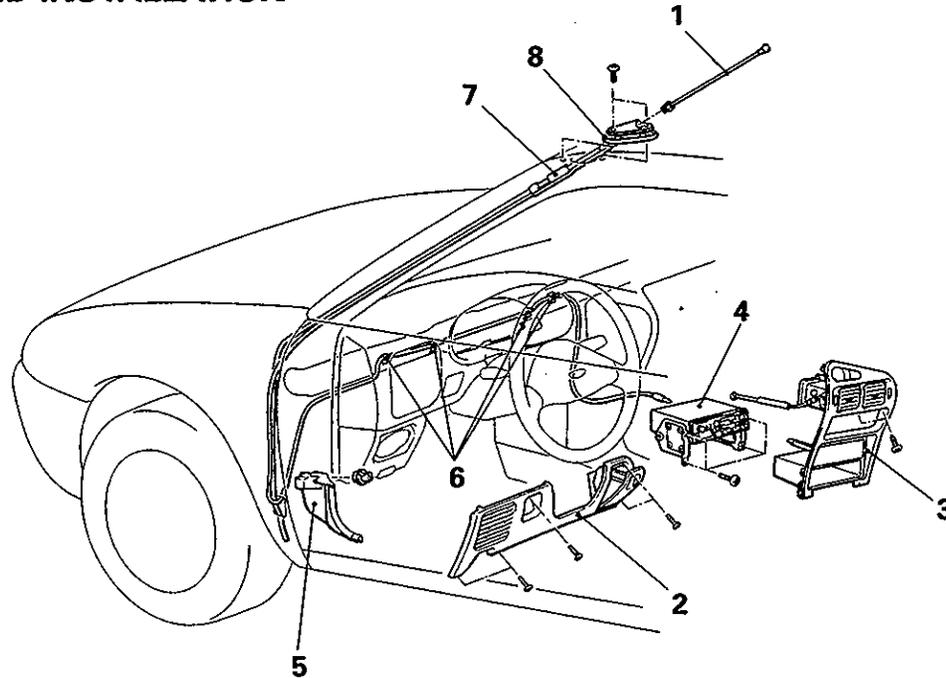
**SERVICE POINT OF INSTALLATION**

**1. INSTALLATION OF DOOR SPEAKER**

Install the L.H. speaker so that the terminal faces towards the front of the vehicle, and the R.H. speaker towards the rear.

NOTES



**POLE ANTENNA****REMOVAL AND INSTALLATION**

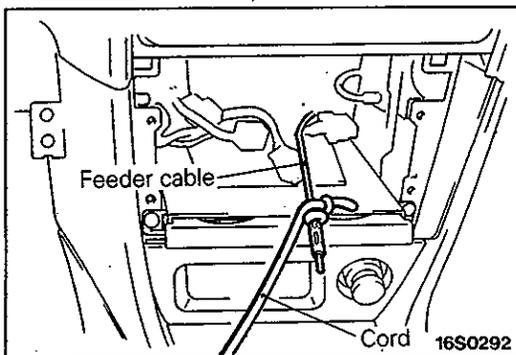
16S0323

**Removal steps**

1. Pole
2. Instrument lower panel
3. Air outlet center panel assembly  
(Refer to P.54-31.)
4. Radio and tape player
5. Cowl side trim (driver's side)
6. Clip
7. Antenna base
8. Base

**SERVICE POINTS OF REMOVAL****7. REMOVAL OF ANTENNA ASSEMBLY**

To make wiring easier when installing, tie a cord to the feeder cable terminal, and then pull out the feeder cable to the antenna side.



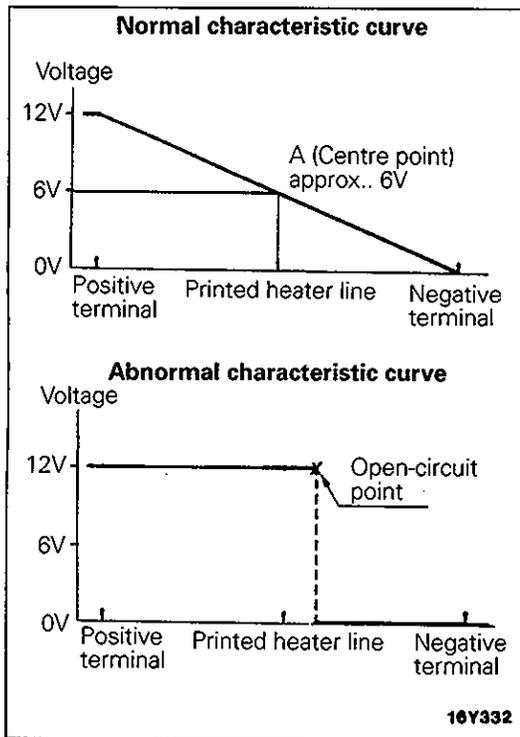
# REAR WINDOW DEFOGGER

## SERVICE ADJUSTMENT PROCEDURES

E54MLAA

### PRINTED-HEATER LINE CHECK

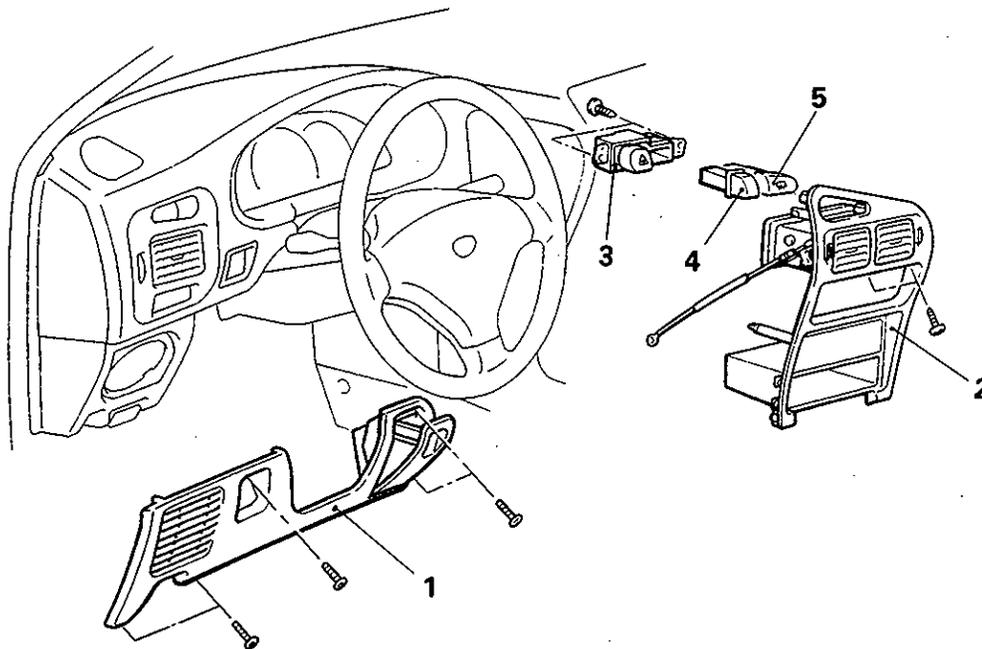
- (1) Run engine at 2,000 r/min. Check heater element with battery at full.
- (2) Turn ON rear window defogger switch. Measure heater element voltage with circuit tester at rear window glass centre A.
- (3) Condition good of indicating about 6V.
- (4) If 12V is indicated at A, there is a break in the negative terminals from A. Move test bar slowly to negative terminal to detect where voltage changes suddenly (0V).
- (5) If 0V is indicated at A, there is a break in the positive terminals from A. Defect where the voltage changes suddenly (12V) with the same method described.



## REAR WINDOW DEFOGGER SWITCH

### REMOVAL AND INSTALLATION

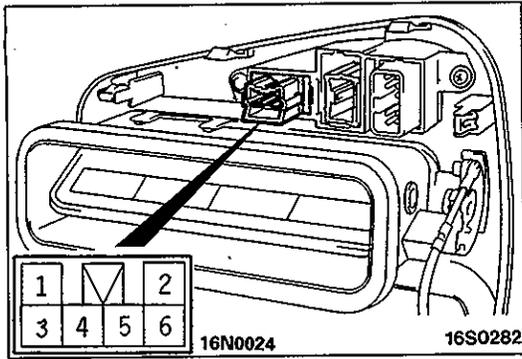
E54MHAG



16S0320

#### Removal steps

1. Instrument lower panel
2. Air outlet center panel assembly (Refer to P.54-31.)
3. Switch holder
4. Switch plug
5. Deffogger switch



**INSPECTION**

E54MHAF

	Terminal No.	2	4	6	1	3
Switch position						
OFF						
ON						

**NOTE**

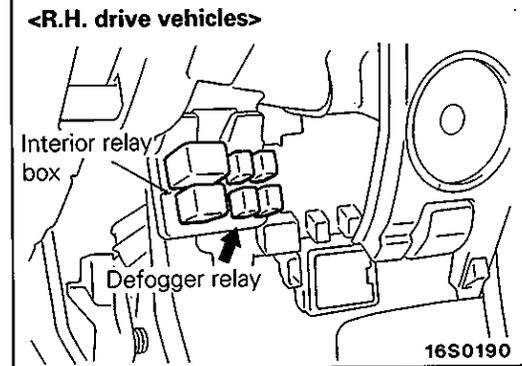
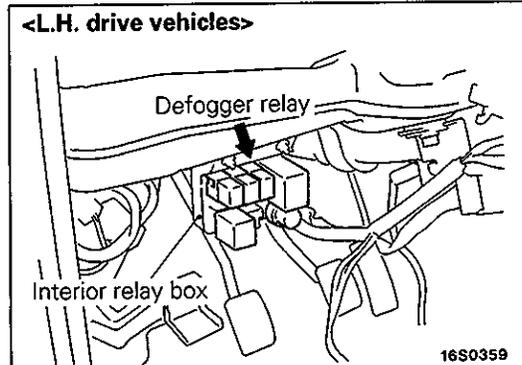
○—○ indicates that there is continuity between the terminals.

**REAR WINDOW DEFOGGER RELAY**

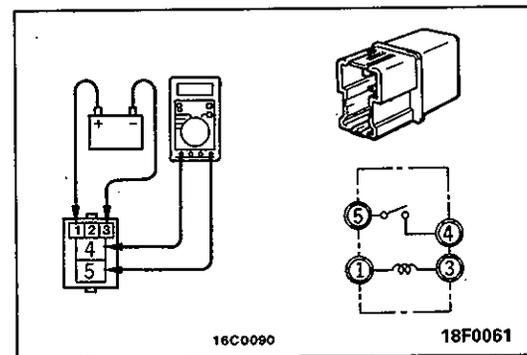
E54MIAE

**INSPECTION**

- (1) Remove the rear window defogger relay from the interior relay box.



- (2) Apply voltage to terminal ①, and check the continuity between the terminals when terminal ③ is earthed.



Power is supplied	④ – ⑤ terminals	Continuity
Power is not supplied	④ – ⑤ terminals	No continuity
	① – ③ terminals	Continuity